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EDITORIAL NOTES.

The War and the Gas Industry.

AFTER the excitement over the declaration and preparations for war, there is comparative calm. If it were not for the signs of precautionary protection about us, the decimation of our industrial and business ranks by the call to arms, the measures taken for the financial defence of the country, and the contents of our newspapers, there would now be little to indicate that this country was engaged with other nations in a greater struggle than has yet contributed to the history of the world. It is perhaps more a habit than the prompting of an actual belief for the Britisher in normal times to point to other countries as illustrative of how much better they do things than we do them at home. But here we are engaged in a war that has raised the whole of Europe to arms—in greater part for active purposes, in only a small part for defence should the occasion arise—and that has cleared the decks for action of the most mighty fleets in the world. Withal, though a large army has been moved in, and transported from, this country, though there has been a great going to and fro of troops and materials in connection with home protection, though our naval reserves have been called up, all this has been done, by marvellous organization, without the country experiencing any great dislocation of the ordinary railway services. In a week, too, a great change has been effected for the overseas trading and commerce of our country. We are blessed beyond measure in this respect above all other countries that are at war. The seas have been practically swept of hostile ships; and hostile fleets have been localized, and our ships are keeping watch over them. Coal can be brought—at any rate, now—from the north to the south by boat without particular danger; the trade routes to all parts of the world, save with Germany and Austria, have been rendered safe by the scouring of the seas—excepting for a stray German cruiser or two, which have been reduced practically to an impotent state owing to the sharp look-out of our own warships. Marine insurances have been reduced, and are not to-day on such prohibitive lines as a week ago. The Government have, in short, in collaboration with the country's leaders in the military and maritime services, and in the financial, commercial, and insurance worlds, worked wonders. Our national organization and machinery have been put through the utmost possible crucial test; and they have not been found inferior to those of other countries. Even the Britisher who has been wont to decry his own country in comparison with others, must now acknowledge that he did not thoroughly know his own, and will entertain a greater respect for it than he previously professed.

How does it fare with the gas industry in these clouded and uneasy times? The change in the position in regard to overseas traffic is a distinct advantage to it. Our remarks on the subject of coal last week are confirmed by the views of such students of conditions as Sir Corbet Woodall, D.Sc., and Mr. Charles Carpenter, D.Sc. Everything now points to coal being plentiful, with the export trade with the Continent largely cut off, and with our home industries working short time or altogether stopped. Contracts, however, have been largely entered into; and so, if supplies become cheaper through reduced demand, all gas-works will not be able to take advantage of the condition. But though coal may be plentiful and cheaper, there are the risks of not being able to get hold of it through sudden emergencies, disturbances of the railways, or trouble near at hand on the North Sea. Anyway, transport must be dearer. There is no occasion for present alarm in connection with supplies; but there is reason for taking every available precaution while there is the opportunity. As to oil, there is a good stock in the country; and we are asked to contradict the report which obtained currency soon after hostilities commenced, that the Standard Oil Company had stopped the export of petroleum and other oil products destined for Europe. Thanks to the British Navy, there is no difficulty in this respect; and it would have been a pity had there been, in view of the assistance that cheaper oil and low-priced coke can be to the gas industry, and in helping the conservation of coal stocks. There is not likely to be trouble over our incandescent gas mantle supply, for reasons stated in another article; but repetition here of one point that will be found in that article may help to impress it. It is that the British mantle makers are very desirous that all gas undertakings should obtain, store, and sell to them as much mantle ash as possible, and preserve their inverted mantle rings and packing-boxes for further use.

Of course, however much the conditions are eased by wise administration and the smooth working of national organization, the country and all in it must feel in one way or another—perhaps in many ways—the effects of the extraordinary tax upon its resources; and the duty of every individual is to do his share, by rendering assistance and by economy, in the plans to ameliorate distress. The Government are seriously determined to see there are no oppression and aggravation of distress through inflated prices for necessaries while the occasion does not exist; and, indeed, anyone who raises the price of any necessary, when it can be avoided, under present circumstances, is an enemy to his country. The gas industry may be pledged, here and now, not to put up the price of gas, so long as it can hold out against such a proceeding; and the price of coke will not be raised above its fair fuel value. As to the prospects of the gas business in these times, there will without doubt be a falling off of consumption in some quarters for industrial purposes. But as to domestic supply, that is likely to be good. Casually meeting the Chairman of the Brighton and Hove Gas Company (Mr. A. M. Paddon) the other day, in conversation he made the point that, in residential districts, owing to reduced earning power, it was not very likely that people would stock their coal-cellars to the same extent as usual, and, with the convenience and three months' credit given by gas undertakings to ordinary and industrial consumers, gas would in these directions probably be used more than ever. Moreover, throughout the country, there is a disposition to stay at home, and to indulge in less pleasure and less holiday making. This, the houses of entertainment are feeling; and so are the seaside resorts —especially along the east and (to a less extent) the southern coasts. The gas undertakings in these places will unquestionably feel the effect of the reduced summer demand. But if the unexpected happens and peace is quickly restored, there may yet be a chance for them to recuperate somewhat; and, before the war commenced, they had enjoyed an earlier influx of visitors than ordinary.

As to coke, the stocks at gas-works are a fuel safeguard to every city and town; and, if the war continues for any length of time, there is almost certain to be an increased local demand for it. But it would be mistaken policy to raise the price unduly, however large the demand; for the recent condition of the coke market shows the necessity of using all opportunities for popularizing the residual. Tar is in worse plight, perhaps; but the surplus can be stored with the full knowledge that its time will come. The road-tarring season has passed; the outlet to Germany is closed; and the tar distillers are not, under present conditions, likely to be extensive buyers. The sulphate of ammonia market is in different case. A week ago, there was practically a suspension of business in the commodity. But now that export to most parts of the world is again possible with safety, there ought to be a better sale for the residual. Between July and December last year about 160,000 tons of sulphate of ammonia were exported from this country, and of this quantity only about 9000 tons were shipped to Germany, France, and Belgium. During that time

Germany was also developing an export trade. This, that country is unable to do under present circumstances. Then why should we not get more of the business, with the trading routes overseas open to us? We cannot see any reason why (unless the general unsettlement affects it) the export business, which represented about 150,000 tons during the second half of last year, and possibly something besides, should not be again secured this year. Just consider where this 150,000 tons were shipped to; and there will be seen some reason for confidence: Japan, United States, Spain, Portugal, Italy, Canaries, Holland, Java, British Guiana, West Indies, Mauritius, and a few other countries other than France, Germany, and Belgium. No doubt insurances will be somewhat higher; but they are not so high as they were a week ago.

From these considerations, there seems to be ground for thinking that, though the strain of the times will be universally felt, the gas industry will not experience the worst of the effects of the present dire conditions. This is our confident view; and it is widely shared.

The South Metropolitan Nitrate of Thorium Store.

RISING in general importance at this time above all other matters composing the address of Mr. Charles Carpenter, D.Sc., at the meeting of the stockholders of the South Metropolitan Gas Company last Wednesday, was that of the position of the supply to this country of incandescent mantles, during the continuance of the war. Just so long as Germany is hemmed-in in a manner that makes export from her shores impossible, just so long will the supply of incandescent gas mantles from her several factories be at an end, and just so long, too, will there be a void in the supply of nitrate of thorium to the British mantle manufacturers from the German Syndicate, who have so effectually controlled it. Practically for all time since monazite sand as the source of nitrate of thorium has been an essential to the life of the lighting business of the gas industry (as equal in importance, in fact, to lighting as coal is to gas manufacture), the Syndicate have only allowed the supply of nitrate of thorium to come to this country in carefully regulated quantities. As Mr. Carpenter graphically puts it, the policy of the Syndicate has been, so to speak, to merely "feed" the British manufacturers "with a spoon." What is the result? War is here; trade with Germany has now been effectually closed; and we are faced with the "startling "fact" that there is hardly any nitrate of thorium available to-day in the hands of the British makers, while the stock of mantles in the possession of the wholesale and retail houses must be, with the heavy lighting season approaching, a diminishing quantity. It was quite a natural proceeding on the part of the Thorium Syndicate, being largely constituted of makers of mantles in Germany, that they should prefer to supply from their own factories the mantles complete rather than the nitrate of thorium to British mantle makers; and the result is that a large percentage of the mantles used in this country has hitherto come from Germany and a smaller percentage has been home-made—the proportion being, according to Mr. Carpenter, 75 per cent. from Germany and 25 per cent. from the British makers. But it appears to be more likely that the actual ratio has been 60 to 40. The exact proportion, however, does not matter. Either of the larger figures shows the part that Germany has hitherto taken in providing this country with incandescent mantle stocks; and now we are faced with the question whence supplies are to come if the war is a prolonged one? Its duration no one can foresee.

Some of the British mantle makers confess that they have not a large store of nitrate of thorium; and, this being so, it is their business to supply first those customers who have hitherto patronized them and to fulfil their contracts. This is only fair, although many gas undertakings and dealers (who have in the past purchased only the German makes) have, now that there is the uncertainty of securing supplies later on from their ordinary sources, been making inquiries of the British makers, and sending them orders. A second string to the bow may be that it may be possible, now that the trade routes with America are free from danger, to secure supplies from the United States—if necessary. But we do not think the necessity will arise, and for more than one reason. Many undertakings that appreciated the position have already laid in considerable stocks of mantles; and the wholesale and retail houses are not all yet destitute of stock. But even stocks have limits, and cannot last an indefinite time. There is still another string, and for that the thanks of the gas industry are due to the enterprise of the South Metropolitan Gas Company. It was Mr. Carpenter who had the pleasure of calling attention to it at the meeting of the Company last Wednesday. It has now grown quite a time-old fact how, during 1904 and early in 1905, the "JOURNAL" was made the vehicle for the publication of certain intelligence on the question of the fight that was then pending between the German Syndicate and American interests—principally the Welsbach Company of America, in which the United Gas Improvement Company were very largely interested, in which, in turn, we believe the Standard Oil Company were concerned. Sir George Livesey (who had within these office walls been interesting himself in the matter of the information as to what was transpiring) was faced one day with the question as to what would happen to the British gas industry if nitrate of thorium were cornered, or anything else occurred to cut off supplies. The question startled him. Other events may have occurred to awaken concern in his mind, and to stimulate action. At any rate, in the Directors' report issued in August, 1905, there was the announcement of the purchase by the South Metropolitan Company of a monazite sand property in North Carolina, in order, it was said, to protect the interests of the consumers in the Company's district. The following reference to the matter appeared in our editorial columns at the time:

> We have on several occasions made covert references to the purchase, through British enterprise, of a monazite sand property in North Carolina. The secret is out in this report; the purchasers being no other than the South Metropolitan Company. It is almost superfluous for us to say, from independent knowledge, that to the Chairman's dominant characteristics of initiative and tenacity is due this unique step in defending the Company and their consumers against the monopolies in monazite sand and thorium. We do not desire to make any inflammatory statement concerning the position of the prime constituent in the incandescent mantle; but the fact remains that the visible supplies of the necessity are in the hands of a few, and that is tantamount to a cornering of the supply. Although the price of thorium has risen considerably, no great amount of mischief has so far been wrought. *But who can speak with any degree of confidence as to the future?* There is this to be said, that even if this independent and remarkable action should not have any immediate or direct benefit for the South Metropolitan Company, there can be no question that the taking of the "bull by the horns" in this manner by Sir George Livesey and his colleagues will make a marked impression just in the very direction where it is most needed.

The action of Sir George and his colleagues was looked upon, in several quarters, with good humour, as having nothing more in it than the satisfying of a whim of an enthusiast. In more than one quarter, the purchase of the monazite sand and the stocking of the nitrate of thorium produced from it were referred to as a "white elephant." But the nitrate has been kept in the stores of the Company for use (as Mr. Carpenter says) when the necessitating emergency arose. The "white elephant" to-day represents the strongest protection we have against mantle trouble, now that an emergency has arisen the duration of which cannot be foreseen. There is practically no other nitrate of thorium in the country—save these thousands of kilos. The South Suburban Gas Company have some, there may be a little in the hands of chemical manufacturers, and the British mantle makers have some—but not much. The South Metropolitan Company are not prepared, and have no desire, to be "dogs "in the manger." If the British gas industry wants this nitrate of thorium, should occasion arise, it can have it—at a price. It cost the Company much money, there is the interest on the money spent, and the reserve has had to be protected by the Company for the greater part of a decade. The Chemical dealers would probably like to buy this nitrate of thorium to-day at a heavy price, and surmount it by a good profit for themselves. But Mr. Carpenter and his colleagues have other views as to its disposal. They are not going to lose control of this asset that the Company have so long held for protective purposes—an asset that has also been of great indirect advantage to the gas industry, in that knowledge by the Thorium Syndicate of its possession by the Company has no doubt had a restraining influence upon them. Since that nitrate of thorium was first stored in the cellars of the Company, the price of this essential to mantle making has never been so high per kilo as the figure to which it rose before the trouble, some ten years ago, over the new contract for the Brazilian monazite sands. To the

South Metropolitan Company the British gas industry has, in this matter, been (though it was not recognized) a continuous debtor; now that the War Office and the Admiralty cannot say whether the present war is going to last three weeks or three years, an emergency has arisen—an emergency so amazing was never contemplated when the North Carolina purchase was effected—when the store may prove to be of inestimable advantage, and the debt may be increased many fold.

Considering—let us repeat—the capital sunk in the provision of this reserve, the loss of interest, the risk that they ran, and all the trouble to which the Company have been put, the Chairman (who was Sir George's lieutenant at the time the purchase of the monazite property was made) and his colleagues are making a very reasonable proposition elsewhere in our columns. It is to the effect that they are in a position to supply mantle makers, if any difficulty is found in the supply of mantles, with large or small quantities of nitrate of thorium at a price based upon an additional cost of ¾d. per ordinary inverted mantle, and 1d. for the ordinary upright type—other sizes in proportion. This is a very fair suggestion; but it would not be fair to expect the Company to dispose of the nitrate of thorium at the price ruling per kilo before the war. The Company might (and no one would have had the right to blame them) have gone another way to work to obtain an immediate benefit, to the disadvantage of the gas industry and its lighting business. Meantime the President of the Institution (Mr. John Bond) and the British mantle makers are anxious that gas undertakings should not waste any of their mantle ash, but should take the utmost care of it, as well as of the inverted mantle rings and mantle packing boxes. Every little may help, if it is impossible to import nitrate of thorium and mantle material for any great length of time. As to ramie, we have always cotton upon which to fall back.

Just one other point. Mr. Carpenter hopes the lesson that may be learnt from the present nitrate of thorium position will be applied when things arrive at the successful issue for which all Britishers pray. The British gas industry must not be caught napping again; nor must it allow itself to help to perpetuate the old charge of lack of enterprise and encouragement in support of British manufactures. On this occasion it is protected from danger. By whom, and by what? The South Metropolitan Gas Company, and their enterprise a decade ago.

Since the foregoing was put in type, and just as we were preparing for press, an article (appearing on another page) was received for publication from Mr. Thomas D. Asten, the Chairman of the Voelker Lighting Corporation, Limited, in which he calls attention to the tremendous deposits of rich monazite sand—sand containing 8 to 10 per cent. of thorium oxide, or about double the richness of the Brazilian deposit—at Travancore in India. The deposit appears to be quite sufficient for all time for the gas industry. But the writer of the article is of opinion that the British gas industry has a very just cause of complaint in regard to it, in that the concession for the sand was obtained by a German from the Indian Government, and that the present control (so the article traces out) is still not only indirectly under German domination, but what is also bad is partly, if not largely, under the control of electrical competitors. It is considered that a deposit of the kind in a British possession ought to be safeguarded first for the United Kingdom and the British Dominions beyond the seas, and not be allowed to be controlled in any way by concerns largely linked-up with a foreign country, which at some time or other may be at war with the British people. Now nitrate of thorium is wanted, but cannot be obtained, though India possesses so much of the monazite sand. That is the anomalous position to-day; and the British gas industry would be practically "floored" were it not for the private enterprise referred to above. The Voelker Company are proposing to bring the facts contained in the article published in this issue before the India Office; and they strongly urge the gas industry to do a part in trying to get the Travancore contract cancelled, and the control of the sands placed beyond any doubt whatever under sole British control. We have not had an opportunity of examining into the details of Mr. Asten's article; but he says that he is abundantly satisfied that the facts are as stated by him.

The Gas Exhibition Deficit.

Some nine-and-a-half months have now elapsed since the National Gas Exhibition closed its doors; but the closing of the doors did not stamp the word "finis" on the mass of voluntary work that was undertaken in connection with it by a comparatively few people. We have always held, we continue to hold, and we know, both from investigation and observation, that we are right, that the Exhibition abundantly fulfilled its mission, one part of which was to stamp upon the public mind the position to which the gas industry had attained in ministering to the community and industry. The details in the winding-up of the affairs of the great Exhibition have now been brought to an end, excepting in one particular about which more presently; and we have before us the report of the General Committee to the supporters, which report is signed by the President of the Exhibition (Sir Corbet Woodall, D.Sc.), the Chairman of the General Committee (Mr. Edward Allen), and the Chairman of the Executive Committee (Mr. F. W. Goodenough).

From the report we learn that the total attendance of the public at the exhibition was, in round numbers, 200,000. This is very satisfactory; for there we have a potential advertising body, many of the units of which carried away from the exhibition more information than they possessed on entering its doors. The information has surely not remained with them a secret possession, but has been from then till now, and will continue to be, disseminated by them in all sorts of places, and at all sorts of times. It is learned, too, that the number of inquiries recorded was 7794, and that these inquiries refer to no less than 407 gas undertakings and 78 trading firms. The 407 gas undertakings is significant of the fact that the visitors to the exhibition were residents in all parts of the country. But as indicative of value, we do not pay much attention, though the number is quite a respectable one, to the inquiries figure of 7794, as we know that numerous gas undertakings had inquiries made to them direct as the result of the exhibition, and so did many firms. The number of inquiries recorded is, therefore, very much below the actual. Indeed, one will never be able to state the value of the exhibition in terms of absolute result, nor give to its value any time-limit. Take the professional men and women—architects, doctors, educationists, hygienists, and social workers—the informative work that was done among them now occupies a place in their technical equipment, and will be applied as occasion favours. Had the effort been less than it was, it would have been beneath the dignity of an industry holding such status in the land as that of gas supply.

But in connection with this effort and display of the place of the gas industry in the country's service, we are faced with a deficit of £3455. This is an unpleasant fact. There would have been no deficit had it not been for circumstances over which the Committee had no control. They were the victims of an over-exacting paternal form of local government, with ideas on the subject of public safety that at times reach beyond the bounds of rationality, and they were also the victims of that great unrest and captious mood of workers in the building trades in regard to trivialities characterized as rights, which preceded the stoppage of all building work in London for several months this year. Unnecessary expense was rushed upon the Exhibition Committee at the eleventh hour by the County Council; the building workers occasioned them an enormous expense in overtime and Sunday labour by their strikes and easily aroused disaffection. These were the causes of the deficit. The Committee are now making an appeal to liquidate the outstanding debt. Considering that there are 1000 gas undertakings that did not subscribe a penny to the exhibition funds, the division of the sum between them and the generously disposed previous subscribers would make a few pounds from each concern a sufficient contribution. The Committee recognize that they are very unfortunate, in the circumstance of time, in making this appeal; but all the arrangements for sending out the report and making the appeal were concluded before the outbreak of war. The gas industry has to share in the "hard times" on the brink only of which we stand; and it is incurring heavy expenditure in the maintenance of the families of its men who have been called to stern work in the defence of the country's honour, obligations, and interests. All the same, the £3455 could be easily wiped-out by a widespread contribution; and it would be nothing short of a disgrace to the industry to allow this debt to continue to longer hang over it.

Small Works Problems.

THE great European upheaval was not considered a sufficient obstacle to the holding of the annual meeting of the Irish Association last Tuesday, with a pleasant excursion meeting the following day—all arrangements having been made before the declaration of war. At the meeting, there was an amplitude of matter (even without the interesting paper on "New or 'Double' Gas" by Mr. C. B. Tully, who was unable to leave Hythe in Kent to get across to Ireland) to engage the attention of the members—if anything, rather too much of it for it all to obtain adequate consideration and discussion. The President—Mr. J. P. Fitzpatrick, of Maryborough—being the manager of a small works, naturally gave in his address considerable attention to some of the problems affecting undertakings of minor dimensions. One has a great deal of sympathy for the managers of undertakings of the smaller size doing business in remote places, and under conditions that are more often than not of an opposing order; inasmuch as raw material being purchased in comparatively small quantities, and transit being usually somewhat awkward, they have to face a heavy cost right from the outset, while the limited local circumstances make increasing business more difficult, and the residuals less profitable than in the larger towns. Capital expenditure, too, is great in relation to business done. Dearness therefore exists where conditions demand cheapness; and altogether the manager, being responsible for the works down to the minutest details of the management of the undertaking, and often compelled himself to take a hand in the manual work, finds his lot anything but a bed of roses. Those who employ him ought to have a liberal consideration for him, instead of a parsimonious one; and, in view of his conditions and isolation, it is to be hoped that note will be made of Mr. Fitzpatrick's protest against tight-fisted administrators who deny to their gas managers the facilities and wherewithal to go to the periodical gatherings of their fellows, and profit by conference with them. Such conference gives, as a rule, a good return on the cost incurred. We have known of cases where little "wrinkles" gained on such occasions have meant permanent economies and improvements. But after all, the lot of a manager of a small gas-works in Ireland, or elsewhere in the British Isles, is not anything to be compared with his compeer in Australia and other of our Colonies, where he is altogether sequestered. This must have been brought home to several who heard the paper describing some of the personal experiences of Mr. H. M'Elwee. The paper gives one an extraordinarily good glimpse of the life and work of the gas manager labouring "far from the madding crowd" of the large antipodean cities.

It is not often that we (and it is a very good thing that we do not) get into touch with national political topics in Presidential Addresses; but Mr. Fitzpatrick managed to incidentally touch upon Home Rule. There is not any disposition on his part to regard the existing scheme as unassailable, as he possesses a firm belief that when—the "when" requires a big interrogation mark after it—peace is proclaimed, the lion will lay down with the lamb (which is the lion and which the lamb we do not choose to determine), and work together to formulate a scheme of self-government on a sounder financial basis than the present one. Our legislators at Westminster ought to be very interested in learning that a practical man of business in Ireland sees financial defects requiring remedy in the wonderfully spun measure. But that is not a matter for us. For the moment, a more important one is the results upon the gas industry in Ireland of the scheme of local government. If one of its effects is to revive industries and re-establish a greater prosperity in the land, then the gas industry there must gain advantage. But we rather incline to join issue with the President in thinking that, if another result is the purchase of some of the smaller works by urban councils, this will be a "benefit." We are disposed to take the view that, with a general increase in prosperity over the land, private enterprise is, or should be, well equipped to foster gas-works and increase their profitable service to the communities. We have, however, a sympathetic leaning towards the point made by Mr. Fitzpatrick as to some form of local government in Ireland improving and making less costly and tedious the securing of statutory powers for its undertakings. It has often appeared to us an anomalous thing that small undertakings in Ireland should be put to such enormous expense over promoting and then meeting opposition to private measures in London, and often before Committees who have little or no knowledge of the local conditions. All that can be said in defence of the present practice is that it is only by the use of one set of experience and machinery, such as is situated at Westminster, that co-ordination of local legislation can be obtained between all parts of Great Britain and Ireland, and more so, so far as the gas industry is concerned, in these days of its transition. The next best means is undoubtedly such machinery as has been set up in Scotland under the Private Legislation (Scotland) Act, 1899, which gives the same close approach, without Home Rule or any other form of local government, to the localizing of Private Bill procedure, such as the President desires for Ireland.

An "eye-opener" is given by Mr. Fitzpatrick when he points out that, in these days when "cheap gas" is so frequently on the lips of gas men, there are in England and Wales no less than 220 small gas-works with charges per 1000 cubic feet ranging from 5s. to 6s. 8d.; in Scotland 101 works charging 5s. up to 8s.; in Ireland 65 charging from 5s. to 7s. 6d. This is a condition of things that we hope to see gradually altered, though these works really represent a small percentage of the gas supply of the British Isles. But the maintenance of such prices are the surest means of bringing about the wrecking of the fortunes of gas-works which are, by their limitations, let alone through the prices that they charge, more vulnerable to, and more exposed to injury from, any well-directed competition than the larger gas concerns. Speaking generally, conditions cannot be worse in any place in England and Wales and Scotland in regard to circumscribed opportunities than in Ireland; and yet it is satisfactory to learn that there gas of good calorific power, and comparatively free from sulphur compounds, has a large field before it. But something must be done to get down to lower figures than those quoted by the President, because it is not conceivable that gas costing 5s. to 7s. 6d. is going to achieve any considerable application for industrial, heating, and cooking purposes, which are the directions of especially bright aspect for the gas industry. It is in this connection that we are sorry the paper by Mr. Tully was postponed to the next meeting, because it bore on this very matter—the author suggesting that one way of cheapening production would be by plant producing in one operation a poor gas from coke and a rich gas from coal for enrichment, thus completely gasifying all the raw material save a small amount of tar. The paper would have been worth discussing in considering how far such a scheme would enable small gas-works to reduce their manufacturing expenses, and so broaden the means to increased business.

Public and Other Lighting.

Two of the papers read at the same meeting treated of lighting questions—one being on recent experiences with "Selas" high-pressure installations, by Mr. C. B. Outon; and the other on economical street lighting by Mr. Malcolm Littlejohn, M.A., B Sc. They were both practical papers; but in neither of them was there a great deal which could initiate and sustain discussion. There is no question about it that, in some quarters of the gas industry, and in many of our local lighting departments, there is ample room for a closer acquaintance with the correct principles of public lighting. Only the other week, Sir Corbet Woodall, reporting on the Blackburn gas undertaking, had to refer in terms of strong condemnation to the lighting of the streets. Fortunately the Gas Department is not responsible for the work; but those upon whom the responsibility does rest must have felt severely the lash of Sir Corbet's censure. He said that he found the lighting was worse than in any town known to him of equal importance. "The lanterns were dirty, and the "mantles bad and neglected; while no effort appeared to "have been made to show what gas is capable of." Another gas critic who has lately returned from a seaside resort on the east coast tells us that the lighting of the place is a disgrace to the town and to the agents by which illumination is obtained—both gas and electricity being used. There is no excuse for such conditions in these days.

The paper by Mr. Littlejohn forms a good starting-place for those concerned who have neglected the study of scientific public lighting. It covers all the ground, from practical principles governing installation to the profitable results that are to be derived from maintaining proper control over the lighting and the work attached thereto. It is only of late years that the illumination of our streets has been studied scientifically, and standards worked to. But this unfortunately only applies to a comparatively few cities and towns. In the majority, the early Victorian rule-of-thumb

methods still obtain, of putting up a lamp-post where most convenient, without consideration as to the suitability of the position from all the points of view of illumination, and with a mere guess at the proper size of the burner to be installed, at the height of lamp column required, and at the pattern of lantern and reflector best suited to the position. There has been little rule and little method, other than—in the major number of towns—a frightful uniformity in height, type, distance, and general inefficiency. Mr. Littlejohn's paper shows him to be a safe guide in regard to the elementary considerations and practices for the attainment of good lighting. With him, we agree it is impossible in public lighting to lay down any hard-and-fast rules. They cannot be applied with conditions so irregular and diversified; and this is where a standard specification will largely come to grief. While, too, concurring with him as to the necessity for having roadways and footpaths properly lit, there must be the little difference with him in saying that we do not want "any light to go upwards." The aim must not be entirely at efficiency on roadways and footpaths, with effect quite ignored. Personally we do not enjoy walking in a thoroughfare with all the upward light rays so deflected that, on some dark nights, one seems to have above the lamps an impenetrable black pall. It is a most depressing condition. Mr. Littlejohn is good in his remarks on the ratio of maximum to minimum illumination in a street; and his observations as to the study of the sizes of units to be used are particularly worth attention.

Found in the paper is the warning to examine well, in order to determine their true value, some of the principles that are applied to illumination. Take, for instance, the very obvious one, that the closer the lamps, the smaller the candle power of the units required to produce the specified minimum illumination; and, as the candle power is proportionate to the gas consumed, it follows that the closer the lamps the less gas will be used, not only per lamp but per street. But gas is not everything. It may be the heaviest individual item in the expense; but the small-unit lamps closely spaced build up a substantial *contra* account to set against the saving of gas. There is the larger initial expenditure; there are more lamps to be kept clean and burners to be adjusted; more mantles are required; there are more lamp columns to be painted, and more panes of glass to be kept in order and renewed; and, in fact, more everything, except gas. There must be judgment based upon the conditions in each case, aided by knowledge of the fundamental laws. It is interesting to note that the small-unit burners used in Glasgow are without gas and air adjustment. As to the trial high-pressure lighting there, the results are being awaited with interest. One point more in regard to Mr. Littlejohn's paper. He holds that claims for lamps should be stated in terms of their mean hemispherical candle power. Such tests are not practicable for considerable street work; and we do not see much sense in claiming a candle power for a lamp which power is derived by a system of testing that is not, without much inconvenience and labour, applicable when the lamps are in use. It would be much better to decide on some system of testing which could be applied in determining the claim of a lamp *in situ*—as, for instance, testing at angles of 20° and 50°, the mean of which tests, experience has shown, practically agrees with the mean hemispherical candle power.

Railway goods yards and such-like places are excellent ones for testing the efficiency of any system of illumination; and Mr. Outon had a gratifying tale to tell of the results that are being obtained with the "Selas" system in the Dublin goods yards and stores of the Great Southern and Western Railway Company. One of the striking things about the statement of experiences in the paper is—considering the vibration and the other opposing forces to the maintaining intact of mantles in such situations—the account given of low mantle consumption. Even in the heaviest lighting months of the past half year, in the goods yard the consumption of mantles per burner by each 1500-candle power lamp only averaged 2·2, and 2 in the second quarter. This close consumption in the two quarters is rather curious, particularly in view of the fact that, with the 1000-candle power lamps, there is a distinct difference in the two quarters between the consumption of mantles; being as low as 0·6 in April compared with 1·9 in January. The lower the candle power with the "Selas" high-pressure lamp, the lower becomes the average monthly mantle consumption. In the goods stores 500-candle power lamps showed the remarkably level average winter and summer of about 0·4 per burner; the maximum being 0·5 in January. Satisfaction on the part of the Railway Company's officials with the efficiency of the lighting is leading to an extended installation of the system.

PERSONAL.

Mr. Douglas Forbes Irving has been appointed Assistant-Engineer to the Torquay Gas Company. Applications for the position were invited in the "Journal" for the 14th ult.

Last Thursday's "Times," in its first column, contained the following announcement: On Tuesday, the 11th Aug., at Strood House, Freshwater, Isle of Wight, the wife of Maurice Graham, of a son.

We learn from the "Co-Partnership Journal" of the South Metropolitan Gas Company that Mr. William J. Dees, the winner of the third prize in Grade II. in "Heating and Ventilating Engineering" at the last City and Guilds Examinations, is in the service of the Company.

One of the last-elected Honorary Members of the Institution of Gas Engineers has been dignified by a new title. The Road Board, having made some changes in the organization of their staff, Mr. H. P. Maybury, who became Chief Engineer to the Board last November, has now been appointed to a new post, with the title of "Manager and Engineer."

Mr. Carroll Miller, the Engineer of the Providence, Rhode Island, Gas Company (and well known to many in the English gas profession), has tendered his resignation and will shortly sever his connection with the Company. It is reported that he will become General Manager of the Western United Gas and Electric Company of Aurora, Illinois.

Mr. Philip Christian has been appointed Superintendent of the outdoor section of the Southport Gas Department, in succession to Mr. J. E. Blundell, who has been appointed Gas Manager to the Macclesfield Corporation. Mr. Christian's appointment is subject to confirmation at the next meeting of the Council. He has been in the employ of the Southport Gas Department for nearly seventeen years.

During the social proceedings in connection with last week's meeting of the Irish Association of Gas Managers, Mr. G. W. Norman, of the Dublin branch of the Gas-Meter Company, Limited, was the recipient of cordial congratulations upon the fact that his son, Mr. Horace M. Norman, had won a Royal Scholarship, tenable for three years, at the recent examinations of the Royal College of Science for Ireland.

In the course of the report to be submitted next week at the meeting of the Eastbourne Gas Company, it is stated: The Directors much regret that Mr. John Hammond, the Resident Engineer and Manager, has felt compelled, owing to increasing years, to tender his resignation. The Directors desire to place on record their appreciation of the twenty-seven years of strenuous service rendered by him to the Company.

OBITUARY.

The death is announced, as having taken place on the 9th inst., at Sydenham, S.E., of Mrs. Anna Friederike Natalie Garey, the widow of Mr. N. E. B. Garey, who was for many years connected with the European Gas Company, Limited, in several capacities—last of all as Chairman of the Board of Directors. Mrs. Garey was in her 77th year.

Coke as Fuel for Motor Buses.—Showing the growing use of coke as a fuel for industrial purposes, the National Steam Cars are shortly to be fitted with steam-driven motors fired by this fuel, by which, it is anticipated, about two-thirds of the fuel costs will be saved. The engine is of the horizontal double-acting type, with twin cylinders of 4-inch bore and the same stroke. One supply of coke and water will, it is stated, carry a car for 60 miles; provision being also made for a supplementary fuel supply sufficient for a further distance of 50 miles.

Gas Companies' Accounts for 1913.—We have received from Messrs. John Allan and Co. the "Gas World Analyses of Gas Companies' Accounts for 1913." The accounts of 54 gas companies are analyzed (one more than in the analyses for 1912); all the items of revenue and expenditure being worked out at per 1000 cubic feet of gas sold, and the results set out on two large linen-backed sheets. As in the case of the "Analyses of Municipal Gas Accounts," issued early in the year, cardboard rules are supplied so as to facilitate comparison with figures of any of the undertakings given. The work is priced at 10s. 6d. net.

Natural Gas in Japan.—The last number received of the "Journal of the Imperial Gas Association" (Tokio) says that for many years now it has been known that the shores of Lake Biwa, the largest lake in Japan, contained large amounts of methane; but up to a recent date no definite plan for the utilization of the gas had been considered by residents there. Recently, however, it was found by chance that some of the people are already utilizing the gas for lighting and heating purposes. Their example has naturally attracted the attention of residents; and they are now thinking of using it on a larger scale. Should this come to pass, it is observed, the coal gas and electric industries in the province will, it is feared, be affected by the new gas.

THE GAS INDUSTRY AND THE WAR.

A special meeting of the President (Mr. John Bond), the Hon. Secretary (Mr. W. E. Price), and the Secretary (Mr. W. T. Dunn) of the Institution of Gas Engineers took place last Thursday at the Institution rooms, No. 39, Victoria Street, S.W., when questions as to how the war was likely to affect the gas industry were considered. As a result of the discussion, a letter has been sent to Lord Kitchener reminding him of the great importance of maintaining the delivery and dispatch of all material and residuals to and from gas-works, and of the necessity of adequately guarding every gas-works, so that the gas supply shall not be jeopardized, and public panic ensue. The letter also expressed the hope, for the same reason, that the War Office will issue an order exempting horses and all motor vehicles belonging to gas undertakings from being requisitioned.

Mr. Charles Carpenter, D.Sc., points out that, if there is any difficulty in obtaining supplies of coal, almost every gas-works has a good reserve of coke from which manufacturers and householders can supply their full requirements. He regards the large stocks of fuel at the London gas-works as one of the most valuable assets of the Metropolitan area at such a time as the present. For steam-raising, manufacturers and electricity generating stations will find coke an admirable substitute for Welsh coal.

All men cannot go to the war; but there are a good many who can afford to expend four hours a day in serving as special constables in an emergency such as the present. There was last week quite an extraordinary enrolment of men in the Special Constabulary force which has been established in London, at the instance of the Home Office. A large number of London co-partner gas-workers have joined. They were once accustomed to twelve-hour shifts; and four hours' useful public service on top of their eight-hour shifts will be nothing killing for them.

A supplement to the "London Gazette" issued on Thursday night sets out in detail the measures which the naval, military, and police authorities are empowered to take under the Defence of the Realm Act for securing the public safety. Among these measures, it is stated that "any land or buildings, including water, gas, and electricity works, may be taken possession of." Then again, "at a defended harbour the authorities may order all lights to be extinguished, and require all persons without permits to remain within doors between specified hours." Any person who contravenes the regulations may be tried by court-martial and sentenced to penal servitude for life or any less punishment.

Among other subscriptions noted in the "Daily Telegraph" list of the Prince of Wales's Fund may be mentioned the following: Sir John Brunner (second instalment), £4000; Brunner, Mond, and Co., Limited, £2000; W. Cory and Son, Limited, £1050; Sir William Arrol and Co., Limited, £1000; British Petroleum Company, Limited, £1000; W. Cory, £1000; Hawthorn, Leslie, and Co., £1000; Sir Alfred Mond (first subscription), £1000; Sir William H. Stephenson, Chairman of the Newcastle-upon-Tyne and Gateshead Gas Company, £1000; George Tangye, £1000; Sir John Aird, £500; John Aird and Co., £500; Airds Limited. £500; South Metropolitan Gas Company, £500; Tangyes Limited, £500; John Wright and Co., Limited, £500; British Gaslight Company, Limited, £250; Parkinson and W. & B. Cowan, Limited, £250; Stephenson Clarke and Co., £250; Sunderland and South Shields Water Company, £250.

Included in a list which the Secretary of State for Foreign Affairs has received from his Majesty's Minister at The Hague of English persons who are at present detained by the German authorities at Bentheim, is Mr. Ernest J. Hutchence, the Assistant Engineer and Manager (under Mr. W. Anderson) of the Hanover Station of the Imperial Continental Gas Association. Mr. Hutchence has spent the greater part of his life in Germany, having been for the past twenty-five years with the Association, whom he has served on six different works in three separate towns. Another member of the party is the Rev. D. W. Whincup, M.A., who was in charge of the British Church in Hanover. In other parts, also, the German authorities are detaining British subjects who are of "serviceable age"—between the ages of 16 and 44.

The Secretary of the "Volunteer Civil Force" (Mr. W. R. Eustace), of Ruskin House, Rochester Row, Westminster, S.W., asks that it should be made known through the "JOURNAL" that members of the force are prepared to offer their services for the protection of gas-works, water-works, &c. In view of the possibility of riots, he says, it is highly desirable that some satisfactory means of protection should be found; and this they are prepared to do by sending trained men who have had experience in a similar direction. Some particulars of the organization are given on p. 413 of to-day's issue.

The country is realizing now more than ever that it made a considerable mistake years ago in allowing the aniline dye industry to leave these shores and go to Germany. The gas industry has experienced a little shock in finding that it is also a dependent upon Germany for its nitrate of thorium for the making of mantles; but this latter matter is one which is not likely to cause much worry to the industry in view of the foresight of the South Metropolitan Gas Company to which reference is made in our editorial columns. But about aniline dyes, and other necessaries which come across the North Sea, Sir F. Cawley the other day, in the House of Commons, asked the President of the Board of Trade whether, as large numbers of men may be thrown out of work through calico printers, dyers, and other industries being unable to obtain raw material from Germany, and owing to the fact that many necessary materials which could be manufactured in this country are protected by patents held by German firms, licences can be given to English firms to use these German patents during the war? The reply Mr. Runciman gave him was that the Board of Trade have already taken power to deal with cases similar to those mentioned. The Board may make rules to deal with such cases, and the matter is under consideration.

The "Daily Telegraph" has published a special article announcing that there is not likely to be any rise in the price of gas or electricity in London; and next day another article informed antediluvians that a plentiful supply of candles is in hand.

Out of the large number of employees of the South Suburban Gas Company who are liable to be called out for active service, 48 have already gone. The action of the co-partners remaining at home calls for special recognition. Arrangements have been made for the support of the absentees' wives and families, the cost of which will be equally borne by the Company and the employees. The Chairman (Mr. Charles Hunt) said he was proud to know the men promptly expressed, through the Co-Partnership Committee, their desire to co-operate. In addition to contributing to the general fund, the staff has voluntarily and generously undertaken to carry on without extra assistance, so far as may be found practicable, the work of those of their number who have been called to the front. In one word (remarks the Chairman) the spirit displayed by all classes of the employees in the present crisis is beyond all praise.

We learn from Mr. John S. Ineson, the Engineer and Secretary of the Ventnor Gas and Water Company, that (except the foreman) every man on the works—stokers, yardmen, and labourers—has been called up to serve in the Navy and Army Reserves as well as in the Territorial Force. By the 2nd and 3rd inst. every man had left; and there are now on the office staff only the collector and the office boy. The gas and water works and the reservoirs are under the protection of the military. Mr. Ineson doubts whether there is another company so severely affected as his has been. We have similar doubts, and greatly sympathize with him in his very trying position.

A number of men have gone on active service from the Brighton and Hove Gas Company. The Directors, we believe, have decided to provide for wives and children at home by the payment of 15s. per week to each wife, and 1s. 6d. for each child. It is probable that, on the return of the men, the single ones will have their cases individually considered, and a payment be made to them which will help to set them on their feet again. The group of companies in which the Chairman of the Brighton Company (Mr. A. M. Paddon) is concerned as a Director have, in conference, all agreed upon the same line of action.

A meeting of the principal officials of the Gas Department of the Manchester Corporation, convened by the Superintendent, Mr. Frederick A. Price, was held last Tuesday, when it was resolved to organize at once a regular weekly contribution by all members of the staff to the "National Relief Fund" during the continuance of the war. At a meeting of the Executive on Thursday, the amount of the contribution was fixed at not less than 2 per cent. on salaries or wages.

Seventy men of the Bournemouth Gas and Water Company have joined the colours. Mr. G. Crispe Whiteley, the Chairman of the Company, states that the Board are going to see that wives and families are cared for during the war. The Board are proposing to deal with the financial charges in a somewhat different way from most other companies. They propose to institute a special fund. This will be supported by both the Company and the staff—the latter being desirous of doing their part in contributing to the special expense, they being at home in normal occupation and comparative comfort, while their comrades in the Company's service are looking after the country's interests under abnormal conditions.

Sir William Plender has been appointed by the Treasury to supervise and control all transactions of the British establishments of the Deutsche Bank, the Dresdner Bank, and the Disconto-Gesellschaft in the terms of the Government permission given to these institutions to carry on banking business in the United Kingdom, subject to certain limitations and conditions. To act for Sir William Plender, Mr. William Cash, F.C.A., has been appointed official supervisor of the Disconto-Gesellschaft.

The Directors of the Sunderland Gas Company have agreed to keep open the places of all their reservists; and in addition an allowance will be made sufficient, with the Government rate of pay, to make up their wages or salaries. They have also sent

a cheque for £250 to the Mayor of the borough for the "Prince of Wales's National Relief Fund."

The Directors of the Leamington Priors Gas Company are holding open the places of all men who have been called up, and are helping the wives and families during their absence. The Chairman of the Company (Mr. Edward Wright) has sent a cheque for £1000 to the Mayor, for the Prince of Wales's Fund.

The Directors of the Redhill Gas Company are granting half pay to the dependants of all employees who are called up for service, whether Territorials, Reservists, or Volunteers, and are keeping their posts open.

A Patriotic Committee has been formed in connection with the Stockport Corporation, for the purpose of considering the remuneration to be paid to Reservists and Territorials in the employ of the Corporation who are called up for service, or to their dependants. It was resolved that all men should be assured of reinstatement in their positions on their return; and that they should be paid a full week's wages for the week in which they are called, and that afterwards, in the cases of married men, the wives should be allowed 10s. a week, with 2s. 6d. per week additional for each child under the age of fourteen.

The Directors of the Portsea Island Gaslight Company have resolved to re-employ between sixty and seventy of their men who have been called to the flag as Reservists in the existing emergencies of Great Britain.

At a special meeting called for the purpose, the Directors of the Derby Gaslight and Coke Company decided to contribute £500 towards the National Relief Fund now being raised by H.R.H. the Prince of Wales to meet the distress inevitable upon the outbreak of war. A number of the employees have responded to the call to bear arms. All married men will receive half-pay; while the case of the single men will be considered later. All positions are to be kept open. The Engineer (Mr. J. Ferguson Bell) remarks: "I am sure you will be glad to know that gas companies recognize their responsibilities in this grave crisis in our national life."

To safeguard the gas-works of the Oldham Corporation, a number of the local boy scouts have been posted as sentries. The innovation will probably extend to other corporation works. Already scouts are serving in the Town Hall department as messengers. Alderman H. Wilde, J.P., the Mayor of Oldham, and Chairman of the Gas Committee, presided over a meeting held to consider what should be done to help the wives and families and other dependants of Corporation employees who have been called upon to serve with the Colours; and it was decided that the wives and families wholly dependent on the earnings of any employee should receive half his wages, with a maximum payment of 16s. In case of partial dependence, each case will be dealt with according to circumstances.

The Wigan Town Council have determined to provide for the dependants of their employees who have been called up for active service. It was agreed to put the wages of all the men into a common fund, and distribute relief to dependents in such a manner as the Sub-Committee appointed consider adequate.

The Dukinfield Town Council have decided to give the wives and dependants of all the Reservists in their employ half-pay, and to keep their situations open.

The General Purposes Committee of the Burton-on-Trent Town Council have resolved—"That it be a recommendation to the Council that any officer or servant of the Corporation who, as a member of the territorial or other reserve (naval or military) force of the Crown, may be affected by the mobilization or embodiment consequent on the present European crisis, be allowed leave of absence during his naval or military service; that he be reinstated on his return with no loss of position or emoluments consequent on his enforced absence; and that the Corporation allow him half-pay while he is serving his country." A letter was read from Mr. W. Thompson (Hon. Secretary of the Burton-on-Trent Municipal Officers' Guild) stating that he was authorized by the Guild Emergency Committee to offer to the Mayor, or to any local committee which may be appointed for the prevention and relief of distress during the war, the services of members of the Guild in any direction where such assistance could be useful. The Committee expressed their appreciation of the offer of services, which it is proposed to utilize.

The springs, works, and reservoirs of the Portsmouth Water-Works Company, at Havant and Bedhampton, are now being carefully patrolled and guarded by military sentinels, in order that possible treachery by foreigners may be avoided. Trenches have been dug around a portion of the springs. Seventy of the employees of the Company have been called out for active service—being reservists. They are, however, to suffer no financial loss, and their situations are to be kept open for them when the war is over.

The Gas Workers' and General Labourers' Union, which has a membership of 150,000, has decided to relieve from payment of any subscriptions all members who undertake Army or Navy service. On their return they will resume payment, and become entitled to immediate full benefit.

The Directors of Messrs. Brotherton and Co., Limited, of Leeds, have decided that all their employees who are Reservists or who join the Territorial Force for service during the present crisis will have their places kept open pending their return, and will receive, in addition to any payments they may obtain from the Crown, the following weekly grants: Single man with dependants, 5s.; married man, for wife, 5s., and 2s. for each child under 15 years of age. A large number of the staff and employees have already taken up military duties at various places.

The Directors of Messrs. William Sugg and Co., Limited, have decided to make a weekly allowance, until further notice, to all their employees who have been called to serve their country by joining the Colours, and at the conclusion of the war to re-instate them.

The men employed by the firm of Messrs. Willey and Co., Limited, of Exeter, recently met and formed among themselves a Board to administer funds which they decided to raise out of their weekly wages to relieve the wives and families of the men (numbering 100 to 150) who have been called away by the war. Mr. F. T. Depree, the Chairman of the Directors of the Company, said he could promise that the Board would give every possible assistance in the war, and every man in their employ will have his place retained for him. He hoped to see them all back soon.

Mr. H. E. Morgan, the chief of the Advertising Department of Messrs. W. H. Smith and Son, wrote a timely letter to the papers last week, as follows: "I believe one of the gravest necessities at the present moment is to keep before the commercial community the very old and commonplace phrase 'Business as Usual.' For my own part, I am going to do my best to prevail upon all our clients to do their advertising as usual; and I think concerted action of this kind will prove beneficial to all of us." *Verb. sap.!*

Engineers and Secretaries of gas undertakings are invited to send information for inclusion in these notes. No particulars can be published except from responsible members of gas administrations or officials, and from our own regular correspondents.

MANTLES AND THE WAR—AN INDIAN MONAZITE SAND CONCESSION.

By the Voelker Lighting Corporation, Limited, through their Chairman, Thomas D. Asten.

At this time, when the electrical companies, assisted by the new high-efficiency lamp, are making such strenuous efforts to strike at gas through its most profitable and most vital point—its lighting load—and when so many of our supplies are threatened by the incidence of the European crisis, every gas engineer must have indulged in heart-searchings as to the security of the raw materials for making the foundation stone of the lighting industry—the incandescent mantle.

There is little doubt that, wherever electricity displaces gas for domestic lighting, the gas engineer will have the greatest difficulty in retrieving the position; and this becomes increasingly true as the price of the metallic filament lamp falls. The fact that the largest and richest deposit of raw material for mantle making *is virtually in the hands of an electrical corporation* should prove of special interest to gas men at this time.

Mantles are made from two principal ingredients—viz., ramie yarn and thorium nitrate. The ramie is grown chiefly in China, and is spun largely in Germany; and although there are two spinners in England, they have received but little trade from the English mantle companies—one factory having found so little support that it was compelled to manufacture mantles to use up the yarn produced, while the other is supported almost solely by ourselves. In the meantime, the huge German works at Emmendingen have been flourishing largely at the expense of the English gas industry.

Thorium nitrate is obtained commercially from monazite sand, of which, until recently, only the Brazilian deposit, with 4 to 5 per cent. of thorium oxide, was known. In 1909, there was discovered a deposit, enormous both in richness and extent, on the shores of Travancore—the top layers containing 8 to 10 of oxide, the bed increasing in richness with the depth. The discovery was made by a mining prospector named Schomberg, who leased the concession obtained from the Indian Government and the native Government of Travancore, to the London Cosmopolitan Mining Company. The head of this firm declined altogether to discuss the sale of sand to the only thorium manufacturers in this country; and the whole control was vested, through the aid of a "powerful group of Continental Financiers" (we take the phrase from the report made by the mining companies' directors), in another company, again apparently British—viz., the Travancore Minerals Company, virtually a private amalgamation

of the London Cosmopolitan Mining Company, Limited, and the General Electric Company; the preponderance of control being in the hands of the latter. The German Auer Company—doubtless through that subtle link the Osram lamp—then get the sole possession of this exceedingly rich sand; and this possession was the pistol held at the heads of the British mantle companies to induce them to join the mantle combine proposed in February last, the object of the combine being to squeeze not only the British mantle companies, but the whole of the British gas industry. Fortunately, the British companies were able to stand out; and it is now time that the whole of the gas industry with one voice should call upon the Indian Government, through the Secretary of State for India, to cancel the contract which, although it is disguised by the passage through two so-called English companies, hands the control of the raw material (on which the gas industry depends in its fight against electricity), through an electrical company, to a German Trust.

But for the patriotic action of the South Metropolitan Gas Company, in initiating and supporting the manufacture of thorium nitrate in England, and of our Directors in consistently buying English thorium nitrate and English ramie yarn, the gas lighting industry of this country would have been at this time in a parlous state. Gas engineers will appreciate that the Trust to which most of the German houses belonged, bolstered-up by the huge profits of the metallic filament lamp,* was able with its immense output to sell mantles cheaper than the English makers. Not enough of them realized that, when the metal filament lamp was no longer covered by patents, they would have to meet both the increased electrical competition due to cheaper lamps,† and, if the Trust had been successful in forcing the English houses to combine with it, largely increased prices for mantles. Yet several of our largest gas companies are so far blind to their own interests as to buy large quantities from the German Trust.

In conclusion, we shall be pleased to place before any interested inquirer the whole facts supporting the above, including the records of the Geological Survey of India; and we hope that every one interested in the future of gas as a lighting proposition will use to the utmost all the influence at his command to break a contract which threatens sooner or later to convulse the gas industry of this country.

* In the last financial year the profits and royalties from the metal filament lamp amounted to upwards of £900,000.

† The manufacturing cost of producing the 32 candle power metal filament lamp is something less than 4d. each.

THOUGHTS ON THE WAR.

By a British Gas Engineer.

It is not usual in a journal devoted to engineering and commerce to express opinions on social and political questions which may divide the different states of the realm; but circumstances of exceptional importance compel me to break the salutary rule.

I believe I voice the firm conviction of all branches of our industry in saying that the Government chose the only course open to them in declaring war. Probably we as a class realize as well as any in the kingdom the utter futility of war; for our whole interests are bound up with peace and industrial progress. But we also realize that there comes a time in the lives of all men and nations when we know that a stand and a protest have to be made against that fetish which is the arch-enemy of commerce and culture—the aggrandisement of arms. Commercial men accept arms as a force necessary for the maintenance of law and order—nothing more. Now, however, we find it devoloped and utilized for national and personal peculation; and I think that all Englishmen join in condemnation and abhorrence of such a state. We are prepared to bear without complaint the sacrifices we are called upon to make to repel aggressors.

German progress in engineering and commerce has astounded the world; and it cannot fail to excite our admiration. German advance would have been greater still had it not been held in check and hampered by the incubus of arms.

The bonds of friendship between English and German gas engineers have become much stronger of late years; and the zeal and energy of the German engineer has done much to stimulate the whole British gas industry. Quite recently we were all surprised—and perhaps a little alarmed—to learn that a German firm had secured the contract for the large holder for the Tottenham Light, Heat, and Power Company. Our sympathies go out to them; for their progress will be checked equally with our own by that devastating Potsdam philosophy which has become a curse to civilization. That the German engineer does not support such a philosophy is obvious; and the marvellous progress he has made stands as a protest against the dominating party in Prussia.

The question on all our lips is, "How far will the gas industry of England suffer from the dislocation and the destruction which must accompany the war?" It is difficult to foretell. Of course, it will be "Business as Usual;" but it is clear that, if there is a diminution of income, there will be a diminution of expenditure. Ours is not a luxury trade—gas being a necessity in the factory and in the home; but we shall feel the pinch all the same.

The methods adopted to withstand the first shocks—the moratorium, changes in the currency, the fixing of standard prices for food-stuffs, &c.—have been so far successful; but our interests are too deeply cemented in the wellbeing of the nation's industries and commerce to be much relieved by such measures.

Although we shall be weakened, it is certain that the opposition will also suffer; but will it be to the same degree? Delay in the delivery of coal will affect us alike; and then there is the danger of damage or even total destruction of plant which happens to be in the fighting line. The gas industry will suffer through the serious state of the market for sulphate. A shortage in supplies of incandescent mantles will be experienced; and I learn that in some instances it has already been found necessary to exercise strict economy in this direction. But let us look further ahead. That we shall return to our strength is certain. Countries have always been known to recover rapidly from the ravages of war. In spite of the terrible defeats of 1870 and 1871, France is still a most important factor in the balance of European power; and she is largely an agricultural country.

If the aggressors are defeated in this war, we shall have a strictly regulated European community of nations, and under such conditions (which will mean a reduction of armaments) shall probably return rapidly to our old ideals—ideals which for centuries have been the guiding star for all development and culture of the Western World.

And our own industry! Shall we lag behind?

Wooden Water-Mains.

From time to time, in the course of making street excavations in London, remains are found of the wooden pipes which formerly conveyed the water. Not long ago, some main-layers of the South Metropolitan Gas Company unearthed several of these pipes in Tabard Street, Southwark; and in the frontispiece of the current number of the Company's "Co-Partnership Journal" they are shown side by side with modern cast-iron and Mannesmann steel pipes. In the course of an interesting article by the Editor (Mr. Walter T. Layton), dealing with the locality in which the pipes were found and its association with Chaucer and the pilgrims in the "Canterbury Tales," he says the average life of a wooden pipe was found to be about twenty years. The size of the mains was necessarily limited, the bore varying from 3 to 7 inches; consequently it was often necessary to have several lines of pipe in one street, which made detection of leakage a matter of great difficulty. It was estimated that about one-fourth of the whole supply of water was lost by leakage. Between 1810 and 1820, the New River Company substituted iron mains for all their old wooden ones. Two years later, the Surrey portion of their works was purchased by Mr. J. Edwards, under whose administration the wooden mains on the south side of the Thames were gradually replaced by iron pipes varying from 3 to 16 inches in diameter. Thus ended the use of wooden water-mains in the borough of Southwark. Mr. Layton gives two pictures of Old London Bridge, showing the water-works; and a drawing of the pumping machinery as it was in 1731.

North of Ireland Gas Managers.—We are informed by Mr. W. H. Roberts, of Newtownards, that, in compliance with a request by a deputation representing a number of North of Ireland gas managers, he has summoned a meeting to be held in Belfast on Wednesday of next week to consider a special matter.

Use of Gas and Growth of Population.—The use of gas in the United States is growing more than three times as fast as the population. From 1900 to 1910 the increase in the urban population was 34·8 per cent., and during the same period the rise in the value of the illuminating and heating gas produced was 120 per cent. This signifies an increasing rate of consumption per head, and a consequent decreasing cost per 1000 cubic feet. In the four boroughs of New York, the population grew 90 per cent. from 1890 to 1910; while in the seventeen years from 1893 to 1910 the gas sales increased 165 per cent. and the consumption per head reached 8350 cubic feet.

Stray Currents and Ferro-Concrete.—The following remarks on this subject appeared under "Trade Chat" in the "Ironmonger" on Saturday week: "The fears which have from time to time been expressed as to the danger to ferro-concrete constructions from stray electric currents should be largely allayed by a recent report on experiments carried out by the testing bureau of the Darmstadt Technical High School. According to this report, electrolytic action sets in when the concrete is damp, but not when it is dry; and it only attacks the iron binders, which serve as anodes, the cathode irons remaining unaffected. Even the anode irons deteriorate sufficiently to cause fissures in the concrete only when the currents are strong and have been at work a long time. Continuous currents give rise to electrolytic action, but alternating currents have no effect. When continuous currents are in use, the reinforced concrete should be kept dry by isolation or other measures. Another reassuring fact is that the current density used in the Darmstadt experiments was seventy times greater than that which, as judged by the experts of the German Gas and Water Association, causes danger to underground conduits, and therefore requires preventive measures. It is also interesting to note that Professor Rohland, of Stuttgart, who reports on the tests of a reinforced concrete bridge in which cast iron was used, says that both mechanically and in its freedom from oxidation, the cast iron gave satisfactory results."

Shortage in the Supply of Incandescent Mantles.

Notice

to

Gas Undertakings.

In case of any difficulties being experienced in obtaining Incandescent Mantles from the Manufacturers owing to the stoppage of supply from Germany of Nitrate of Thorium, the South Metropolitan Gas Company, which holds the largest stock of this chemical in the United Kingdom, is in a position to supply Mantle Makers with large or small quantities at a price based upon an additional cost of three-farthings per ordinary inverted mantle, and one penny for the ordinary upright type—other sizes in proportion.

F. McLEOD, Secretary,
South Metropolitan Gas Company,
709, Old Kent Road,
London, S.E.

13th August, 1914.

Lord Kitchener's Appeal.

The following is the text of a notice, printed in bold type and red ink, which is being issued :—

100,000 MEN REQUIRED FOR THE WAR.

NO MEN will be REFUSED who are PHYSICALLY FIT for Active Service and between the ages of 19 and 30.

OLD SOLDIERS UP TO 42.

Late N.C.O.'s of Regulars and Ex-Soldiers URGENTLY NEEDED.

Lord Mayor's Message to London.

The following message, addressed "To the Citizens of London," was issued last Friday :—

Mansion House, London, E.C.

To the Citizens of London,—

In view of the spirited Appeal of Field-Marshal Earl Kitchener for the addition of 100,000 men to the Army at this Crisis, I look, with great confidence, to the men of the Capital of the Empire to place themselves in the van of the movement and to come forward and enrol themselves in the Service of their King and Country.

I also urge Employers to do their part, and keep situations open for all patriotic men so enlisting, to the end that none may be prejudiced by responding to their Country's call.

T. VANSITTART BOWATER,
Lord Mayor of London.

The New Army.

TERMS OF ENLISTMENT FOR THE PRESENT WAR.

The following communication has been issued by the Official Press Bureau :—

As some misapprehension still appears to exist, the Army Council desire to make known that ANY MAN enlisting in the Army under the present conditions will be DISCHARGED WITH ALL SPEED POSSIBLE THE MINUTE THE WAR IS OVER, whether this lasts three weeks or three years.

Should the war last over three years, their continuance of service will be OPTIONAL.

I enclose £ s. d. toward the Prince of Wales'

NATIONAL RELIEF FUND.

Name _____

Address _____

_____

This coupon should be filled in, and the envelope, which need not be stamped, addressed to H.R.H. The Prince of Wales, Buckingham Palace, London.

REPORT OF THE GENERAL COMMITTEE TO THE SUPPORTERS OF THE NATIONAL GAS CONGRESS AND EXHIBITION, 1913.

THE General Committee submit the following report in respect of the National Gas Congress and Exhibition, which opened on the 1st of October and closed on the 1st of November, 1913, in the International Exhibition Halls, Shepherd's Bush.

OBJECTS OF THE CONGRESS AND EXHIBITION.

No detailed account of the congress and exhibition is called for, as it was fully reported, described, and illustrated at the time in the Technical Press, to which the Committee desire to express their great indebtedness. All that is now required is first to define the objects the congress and exhibition were designed to serve, and then to consider the extent to which they were attained.

The prime object of the congress and exhibition was to demonstrate and advertise to the public the manifold uses of gas, both domestic and industrial, and its hygienic and social, as well as its economic, advantages.

The public were already very generally familiar with the use of gas for lighting, though not universally acquainted with its latest developments, nor clear upon its hygienic aspect.

To a large extent, also, the public were familiar with the use of gas for cooking; and the great success of the cookery demonstrations at the exhibition (on which Miss Edden and her staff deserve congratulations) was due rather to the eagerness of the housewife to learn how to vary the daily menu than to a desire to learn about the use of gas-cookers.

On the other hand, comparatively few of the public were aware of the multifarious possibilities of gas for industrial fuel, of its utility as a source of hot-water supply, or of the artistic design, efficient construction, and hygienic advantages of the modern gas-fire. A great deal of prejudice, based on ignorance, still exists against gas for domestic heating. Few, moreover, of the educated public were aware of the close relationship between the development of the gas industry and the solution of problems of public health and social welfare.

The aim of the Committee was therefore to provide enlightenment upon these points for actual and potential consumers, including especially the rising generation and those entrusted with its education: (*a*) By inducing the general public to visit the exhibition and attend popular lectures; (*b*) by inducing the "special" public—those who have power in moulding public opinion—to visit the exhibition and attend the conferences; (*c*) by engaging the interest of both the General and the Special Press, and so reaching the great body of all classes who were unable or unwilling to visit the exhibition; and (*d*) by providing material, in the shape of reports of lectures and papers, whereby gas managers can continue the education of the public in their districts.

The exhibition was not planned for the purpose of enabling manufacturers to introduce novelties to gas managers or to canvass them for business. Public exhibitions are not the place for either of these purposes; and no little trouble has been occasioned to managers in the past by the exploiting of untried novelties at exhibitions, which have attracted the public but been found useless on practical trial.

The test of the congress and exhibition was not what the gas manager or his assistant could learn there, but what could the average consumer learn, and whether his or her interest in gas was stimulated by a visit there or by reports of the proceedings.

GENERAL INTEREST IN THE EXHIBITION.

That very widespread interest was taken in the congress and exhibition was evidenced by the very long list of influential men and women who became its patrons—headed, as the industry will always gratefully remember, by Their Gracious Majesties the King and Queen; by the number of civic and other dignitaries who supported the Lord Mayor of London when he performed the opening ceremony; by the large attendance of distinguished persons at the President's reception on Oct. 16; and by the very great amount of space devoted to the various proceedings in the Press of the country.

INTEREST OF THE GENERAL PUBLIC.

As to whether the general public were induced to visit the exhibition, and to attend the popular lectures, it may be said that, after the first few days (when, as a matter of fact, a small, rather than a large, attendance was really desirable, owing to the need for many finishing touches), the attendance of the public rapidly increased, and soon became fully as large as could possibly be dealt with if any advantage was to accrue therefrom, and was often too great for it to be possible for the visitors to obtain, or the attendants to impart, detailed information.

The popular lectures were all well attended, and often crowded out, while the cookery demonstrations were always crowded.

The total attendance of the public exceeded 200,000, including numerous parties of children and students with their teachers; and from the appended report of the Superintendents of the Advisory Staff, it will be seen that a large number of the visitors were genuinely interested inquirers, and that much valuable work was done for the industry at the Inquiry Bureau, which might with advantage have been much larger.

NATIONAL CHARACTER OF THE VISITORS.

The number of inquiries recorded (a great many of which led to good business) was 7794, and had reference to no less than 407 gas undertakings, showing the national character of the crowds that visited the exhibition.

The effect of such an enterprise upon the prosperity of the industry can never be accurately, or even approximately, gauged; but the immediate results in actual orders were in many instances so striking that we have no hesitation in saying that the ultimate gain to the industry will be far in excess of all the money expended upon the exhibition, both directly and indirectly.

In this we are supported by a number of expressions of opinion received from leading gas administrators in various parts of the country, from which extracts are given in Appendix B; while interesting information bearing on the same point is given in the report already referred to (Appendix A) and is contained in other correspondence in our possession.

INTEREST OF THE SPECIALIST.

The interest shown in the congress and exhibition by the specialists—the architects, doctors, educationists, hygienists, and social workers—was very gratifying. A number gave valuable service by presiding over conferences or lectures, or by the reading of papers or the delivery of lectures. A number came to, and spoke at, the conferences, which would have been more largely attended if they could have been held in the evenings. Many more asked (and were willing to pay) for copies of the papers read; and still larger numbers visited the exhibition, made full inquiries, and went interested away. Subsequent correspondence in many cases has proved the depth of the interest aroused.

INTEREST OF THE PRESS.

The amount of space occupied in the Press of the United Kingdom by reports of, or articles on, the congress and exhibition was phenomenally great, amounting to about half-a-mile of newspaper column. And it has not ceased even yet, as reports of papers read or lectures given at Shepherd's Bush still continue to appear in the various professional and trade papers, and editors still occasionally write asking for information on gas matters because their interest was so keenly aroused by the congress and exhibition.

It should especially be noted that very extensive reports of the exhibition and of the various conferences and lectures appeared in the special journals devoted to the architectural, educational, medical, and sanitary professions. This will be of immeasurable and untraceable, but none the less real, value to the entire industry throughout the English-speaking world for many years to come.

It may be said that, even had the space devoted to gas by the Press been only in the advertisement columns, its value would have gone far as a return for the entire cost of the exhibition. But when it is remembered that the space so devoted was all in editorial or news columns, taking the form of news or comment, it is no exaggeration to say that it fully compensated the industry for the entire expenditure of £34,000.

This was all the more remarkable when it is realized with what competition, in the shape of sensational news, our Press Department had to contend at the time—the burning of the "Volturno" in Mid-Atlantic, a great mine explosion in Wales, succeeded by a rapid succession of fatal collisions on railways, and an absorbing political campaign, which filled the newspapers with reports of important speeches, to the exclusion of matter which would be found interesting by their readers in ordinary times.

In spite of this, the proceedings at the National Gas Congress and Exhibition filled a place in the columns of the British Press exceeding that allotted to any previous commercial exhibition within the memory of the most experienced journalist in Fleet Street.

A notable point is that the selection of the available "copy" by the editors was made on account of its news value alone, quite independently of any advertisements, of which, indeed, only a limited amount could be placed.

The importance and value of this are obvious, and on this point the remarks of a weekly paper devoted to a competing industry may be quoted. "Electrical Industries," in its leading article of Oct. 8, 1913, declared that:

> "Another direction in which the electrical industry may learn from the gas industry is the manner in which the newspaper Press has been handled. It is quite apparent that gas has achieved a peaceful penetration of the brick wall which separates the editorial and advertising departments in a newspaper office. More attention has been given in the columns of the Press to a 'non-existent' display than to an exhibition [The Ideal Home Exhibition], which had really something to show on the opening day."

In addition, to emphasize the distinction which reigns between the two sides of journalistic enterprise—the editorial as against the advertising department—the swift repudiation by the leading newspapers of the boast of Reuter's Agency (made just at the time the exhibition opened) that they had command of the edi-

torial columns of the Press through their power as distributors of news, may be recalled. This showed how difficult the "penetration," remarked upon by "Electrical Industries," is, unless it is effected with discretion, a complete sense of responsibility, and a corresponding knowledge of the men and papers dealt with.

Work of the Editorial Staff.

For it may be mentioned that our success in securing such a large representation of the congress and exhibition in the Press was due not only to the news value of the matter itself but also to the personal acquaintance of the Chairman of the Editorial Committee (Mrs. Cloudesley Brereton), and the staff she engaged, with influential men and women on the whole of the leading newspapers, including all the London correspondents of the Provincial Press. These London correspondents, as a consequence, not only attended the exhibition, but asked for articles to be written for them, which they undertook personally to persuade their editors were worthy of publication.

For the work thus organized and successfully carried through the Committee desire to place on record their indebtedness to the Chairman of the Editorial Committee, who spared neither time nor trouble to ensure the efficient handling of the Press Department, whereby such exceptionally good and valuable results were obtained.

Principle of Co-Operation as Opposed to Separate Stands.

One question which everyone was asking before, during, and after the exhibition was: Were we right in adopting the principle of a co-operative co-ordinated exhibit, as against the usual collection of heterogeneous stands displaying the very similar goods of numerous makers?

Not a few manufacturers, accustomed to seeing their goods collected in one space with their name blazoned forth above them, found it difficult to reconcile themselves to the new arrangement, and probably still have a lingering wish that they could have had stands of their own.

All the more honour is therefore due for the whole-hearted way in which all the makers supported the co-operative principle when it had been adopted, and did all in their power to make the difficult work of the Committee as easy as possible. Personal predilections and interests were kept strictly in the background in a manner that reflected the greatest credit upon all. The Committee had the satisfaction of knowing that many of those who at first doubted the wisdom of the scheme subsequently stated that they were convinced of its soundness; and it is hoped that few were disposed to question it in principle—while not necessarily approving all the details of its execution—at the end.

Be that as it may, the fact remains that, judged by the expressed opinions of the public (who were the people we were concerned to attract, interest, and please), the co-operative principle was proved to be perfectly sound. This can be seen from all the opinions recorded in Appendix B; and no contrary judgment on the part of the public was heard throughout the period of the exhibition.

No one would claim that the co-operative exhibit was perfect in arrangement or execution. No human effort ever yet attained perfection; and the Executive Committee were the first to realize that if they had their work to do over again they could improve upon it. Considering, however, that this was the first attempt to carry out such a scheme, that time and means were limited, and that difficulties of no small magnitude were encountered, through the unreasonableness of those over whom it was impossible to exercise control, the measure of success achieved was a matter for congratulation.

Criticism of details in such an enterprise by the onlooker is always easy, and, if made at the right time and in the right spirit, is most valuable. The Executive, indeed, welcomed and acted upon many helpful suggestions made before the exhibition closed. To other critics they can only express regret that their assistance was not forthcoming in time for it to be, as it would most readily have been, considered and, where possible, acted upon.

Advisory Staff.

The work of the advisory staff, to which fuller reference is made in Appendix A, was on the whole excellently done; and the best thanks of the Committee are due, and are gladly expressed, to those undertakings who gave the services of members of their staff to the exhibition. It is hoped that the experience they gained there may have in some measure repaid the generosity of their employers.

Mention must also be made of the valuable work done, under very great difficulties, by the staffs of the Brentford and Gas Light and Coke Companies in carrying through the large amount of gas-fitting involved, without accident of any kind. The Committee's special thanks are due to Mr. A. A. Johnston, the Consulting Engineer, to Mr. E. R. H. Wingfield, of Brentford, and to the Superintendent of Works, Mr. E. Pilbrow.

Historical Section.

Cordial thanks are also here recorded to the several individuals, firms, and undertakings who lent the various interesting objects comprised in the historical section, which attracted much notice.

Balance-Sheet.

The least satisfactory aspect of the enterprise is the financial. In spite of the vigilance of the Honorary Treasurer (Mr. D. Milne Watson) and of the keenness of the Organizing Manager (Mr. F. W. Bridges), the balance-sheet shows a deficit of £3455. This is after calling up all guarantees, including £1000 from the Special Purposes Fund of the Institution of Gas Engineers.

The causes of this deficit were two: (1) The exacting and, in our opinion, very unreasonable requirements of the London County Council, which enormously increased the cost of construction at the eleventh hour; and (2) the incessant and most harassing labour troubles encountered—four strikes in one day was the record—which so delayed the gas-fitting work as to necessitate heavy expense for night and Sunday work. But for these unavoidable obstacles, the cost of the exhibition would have been covered by the income.

There are still over 1000 gas undertakings which have not contributed at all to the cost of an enterprise from which all must, in some degree, have already benefited, and are bound to benefit for years to come; and a strong appeal is made to those non-subscribers to assist now in wiping out the deficit that has accrued. Any additional contributions which those who have already subscribed may feel justified in making will also be very welcome. Substantially increased subscriptions have already been received from a considerable number of undertakings in all parts of the country.

Corbet Woodall, *President of the Exhibition.*
Edward Allen, *Chairman of the General Committee.*
F. W. Goodenough, *Chairman of the Executive Committee.*

July 14, 1914.

Abstracts of the Appendices to the Report.

The foregoing report is followed by three appendices. Appendix A is a report by the Superintendents of the Advisory Staff (Messrs. H. H. Creasey and R. Willsmer), giving details of the

Inquiries at the Exhibition and the Work of the Inquiry Bureau.

The total number of inquiries noted and forwarded to the respective undertakings or manufacturers was 7794, or an average of 278 per day. The highest and lowest numbers taken in one day were 575 and 128 respectively. The busiest days as regards attendance were by no means the busiest in respect of the number of inquiries taken—indicating that the days on which the heaviest attendances were registered were popular or sight-seeing rather than business days. Inquiries were forwarded to no less than 407 gas undertakings and 78 manufacturers, as well as to the British Commercial Gas Association. An enormous number of visitors to the exhibition, while noting and obtaining particulars of appliances suited to their requirements, or to which they took a fancy, would not give their names and addresses, but subsequently applied to their respective undertakings for such an appliance as that shown at the exhibition. From conversations the Superintendents of the staff had with representatives of different undertakings, they gathered that the type of inquiry received at the exhibition was by far in front of the average exhibition inquiry, leading to business in the majority of cases. A proof of this is the fact that less than a dozen inquiries were returned as "not known," &c. The Superintendents think the reason of this excellent feature was that the attendants were not "manufacturers' representatives, each with his own particular axe to grind," and therefore visitors were not pestered to leave their names and addresses in order to swell the number of apparent orders in view. Several examples of this are given.

The exhibition was "National;" but, as inquiries were received from nearly all quarters of the globe, it might well have been named, from a business point of view, "The International Exhibition." Among these inquiries was one from Constantinople, for appliances for assaying purposes in the Royal Mint; another was from the Christchurch (N.Z.) University, for types of metallurgical apparatus and central heating by gas for laboratories; and another was from Johannesburg, for crucibles for melting ore. Many extremely interesting inquiries referring to all parts of the kingdom were made at the bureau, among them being requests for particulars in regard to the application of gas for the following purposes: A crematorium for human bodies; extraction of charcoal from human bodies after cremation; aluminium melting in connection with the manufacture of aeroplanes; development of cinema films, as electric light is not altogether satisfactory; for matching the colours of silks; colour photography. [A representative of the Cinema Electric Installation Company stated that he considered the new silica lamps would prove what he called "colour correct" for colour photography, and up till now they had not been able to find such a light]; town's gas for brickmaking; melting gold by gas; warming of greenhouses by gas [15 houses, each 100 feet in length]; lard making in Belfast; wool conditioning [inquiry from the Inspection Department for the Colonies]; circulators for an estate of 2000 houses at Wembley, a few ordered on approval; crucible furnaces and blowpipes for the Royal Corps of Naval Construction, Admiralty, S.W.; drying-out by gas the top surface of a stretch of roadway under construction.

The Advisory Staff.

The system of obtaining the services of representatives from various gas undertakings throughout the kingdom was quite a new one, and was, of course, accompanied by some risk, as each attendant was quite an unknown quantity to the Executive as

regards ability and general experience. The plan, however, worked out very well, as the attendants were, as a general rule, most enthusiastic and keen. Several, indeed, were willing to work more than the ordinary shifts when, as was occasionally the case, there was a shortage of attendants. General good feeling prevailed among them, and few left without expressing thanks for the treatment they had received, and remarking that they had gained useful experience. The women attendants and the nurses were most enthusiastic and devoted to their duties.

The British Commercial Gas Association.

A feature of the exhibition was the insistent demand by the public for the literature issued by the British Commercial Gas Association. At times the bureau was full to overflowing with people who wished to take away pamphlets dealing with the application of gas to various purposes. On the busiest nights the shelves of pamphlets were frequently almost entirely cleared of their contents; and at closing times "the bureau bore an appearance of having been struck by a tornado or a cyclone." In connection with the literature, it must be mentioned that it was more than two men's work to keep a suitable supply of British Commercial Gas Association and makers' literature on the stands and in the bureau. A number of representatives of both subscribing and non-subscribing undertakings, British and foreign, called at the bureau and obtained copies of different British Commercial Gas Association pamphlets—several leaving inquiries for prices of various forms of literature and framed posters, and others taking full particulars of prices from a list which was supplied by Mr. Mason, the Secretary. Every endeavour was made to obtain the names and addresses of such non-subscribing inquirers, with a view to the Association's Secretary having an opportunity to follow up the inquiries; but in many cases names and addresses were not given.

The Superintendents express the opinion that the time is ripe to circularize again all non-subscribing undertakings, as many representatives seem to be impressed with the value their undertakings were obtaining from the exhibition and the Association's propaganda; several remarking that they would do their best to urge their chiefs to subscribe, particularly when it was pointed out to them that they could not fail to be reaping material benefit from the frequent advertisements and research work carried out by and for the Association, and it was scarcely "playing the game" to remain outside the list of subscribers and supporters. It is possible that some members of the Advisory Staff represented non-subscribing undertakings. If this be so, an indirect advertisement for the Association must have been secured; and it is thought their undertakings might now be more easily won over.

Opinions and Criticisms on the Congress and Exhibition.

The second appendix consists of a collection of opinions and criticisms relating to the gas congress and exhibition received by the Executive Committee from gas administrators in all parts of the kingdom. The following are some of the salient features of Appendix B.

From the Eastern District.

Knowing as I do the enormous amount of labour involved in organizing, and the difficulties in raising an adequate sum to give a really good exhibition, well equipped and artistically designed, on the scale of the recent one at Shepherd's Bush, I have nothing but praise for the recent effort, and I am unwilling to criticize.

There can be nothing but eulogium for the really splendid patronage which was secured for the exhibition. The conferences and lectures that were held are worthy of the highest approbation. They must do enormous good to the industry; and our thanks and gratitude are due to the Executive for having organized such really excellent and varied gatherings. That is a phase of the exhibition that has been almost entirely overlooked by our Technical Press correspondents, possibly through the inability of the members of our industry to participate in all the good things that took place at the exhibition.

As to the immediate and ultimate advantage to the gas undertakings and industries, the advantages to the industries must be considerable and immediate. To all the gas undertakings, the advertising of the exhibition and the Press notices alone should be valuable; but the total benefit will depend on the methods that the chief officers of the undertakings took to avail themselves of the display for the education of their consumers. The London Companies should get great benefit; but in the case of the Provincial undertakings it was naturally impossible to get any large or even small number of the consumers to visit the exhibition.

Regarding the co-operative movement in promoting an exhibition. I have thought over this matter, and, at the present time, it is difficult to see how the last exhibition could have been promoted at all, or could have been as well arranged, unless by co-operation. It certainly has its disadvantages, because it is exceedingly difficult to discriminate as to what appliances should be selected for exhibition; and if all the subscribers are to have their exhibits shown in their proper setting, then the exhibition becomes unwieldy. If, on the other hand, all the subscribers do not get a place they think they are entitled to, then jealousy arises; and it is this disability on the part of an Executive to show what they consider the best and most suitable appliance that causes one of the greatest difficulties in co-operation.

Summing up, therefore, I do not see that we could have done better than we have done at the last exhibition. The public who visited it must have been impressed with the show, and it was for the public, and not for gas managers. They (the latter) are in touch with improvements and novelties as they come out, and should not have to wait for an exhibition to see and hear of them. It may be the case that we are all so much in touch with each other and the manufacturers that some of our professional brethren appear to be disappointed.

It is easy to criticize; but one wants to take all the factors into consideration before saying that the last exhibition was anything but a success. I personally have made the most of it in the interests of this Company; and I again say that instead of criticizing we ought to accord to the Executive our very warmest thanks for the trouble and the time they devoted in promoting and carrying through the exhibition.

From Wales.

First there is the effect produced upon those consumers who visited the exhibition. These probably form a very negligible quantity in point of numbers, but may be taken as more keenly interested in gas development because of their visit. They form the rank-and-file of visitors who came up to see the show; and their impression may be summarized in a few words by stating that they went away fully persuaded that, "somehow or other," the gas people had got hold of most things requisite to produce ease and comfort in domestic, business, and industrial life, and nobody could afford to do without them.

To put it plainly, the ordinary visitor was taken aback upon finding how indispensable in every walk of life the homely and unobtrusive gas supply had become. In fact, to his surprise, the whole industry seemed to be very much alive, and needed no waking up. Then those conferences about hygiene, smoke abatement, and hospital experience, what had gas to do with such subjects? It had never entered his mind that health might be improved or lives saved by using gaseous fuel instead of smoky coal. Here was a revelation indeed; and he must tell the folks at home about it.

The stay-at-home people form the second and largest class of consumers, 90 per cent. of whom, possibly, only heard of the exhibition; and we want to know what they thought of it. By the happy medium of invitation tickets, they are interested in the affair, and read eagerly in their local papers the reports of its proceedings, as well as scrutinize, with some degree of awe, the names of eminent scientists and others who lent countenance and support to the conferences. In a general way, the great majority of the public were thus interested, and ready to hear more about what could be done to make gas more serviceable in *their* way of business. At this stage the gas official comes into the arena, or, to be more correct, pays a visit of inspection to the exhibition, where he examines each section with the thoroughness of a trained eye. So good was it for him, and so freely did it expand his ideas and enlarge his experience, that those few who could not get to London are to be pitied, for they lost the chance of their business life.

What will be the effect of the exhibition upon the average country district? In these hurrying days events rapidly succeed each other, and soon give place to some new sensation. Consequently, if the gas salesman wishes to secure lasting benefit from the exhibition, he must exert himself to maintain the interest and patronage of his clients by reproducing such of the exhibits as may be suited to his district. No town or village can say the gas exhibition availed them nothing, unless they deliberately ignore the innumerable opportunities which it presented to break down deep-rooted objections and false impressions.

What is the predominant feeling left on the mind of a provincial gas official by the gas exhibition and conferences? Briefly, that such an opportunity to display the unquestionably numerous devices which make for comfort and economy in the daily life of the consumer never occurred before on such an extended scale, and that by taking advantage of these devices, according to the requirements of each town—*i.e.*, whether residential or industrial—gas would secure an impetus and stability as one of the world's needs, unparalleled in its history. Further, that by the extended use of gas for heating purposes the progress of the science which goes to make the air of our cities pure and healthy becomes an accomplished fact; and the hope of every right-minded citizen to succeed in combating disease, produced largely by bad surroundings, is assured. To have achieved such a result is a blessing—not to have given such a display to the world would have been a crime.

From Scotland.

The first thought that comes into one's head when looking back on the National Gas Exhibition is the whole-hearted manner in which all connected with it seemed to work together for its complete success. There is no doubt that the relations between all branches of the gas industry will be greatly strengthened by the cordial manner in which they met together to discuss and carry out the great work.

The co-operative principle adopted in the arrangement of the exhibits must have to some extent proved a boon to the general public and manufacturers, in so far as each appliance stood on its own merits; and, considering the great advances that have been made within recent years in the science and construction of gas apparatus, manufacturers had nothing to fear, but much to gain, from the impartial manner in which the attendants explained the working of the different apparatus. The public generally

were left a free hand to judge for themselves as to the capabilities of the style and class of appliance in which they were specially interested, without the solicitations of manufacturers' representatives. The lectures and discussions held in the Lecture Hall must have helped greatly to extend the interest in the uses of gas among all those who attended, and in a lesser degree those who were able to get some insight into the subjects dealt with through the medium of the newspapers and Technical Press.

From Yorkshire.

I am glad to be able to express my approval of the National Gas Exhibition. Such a demonstration of the utility and economy of gas for all the purposes to which it can be usefully applied, combined with the propaganda work done by lectures and discussions during the progress of the exhibition, must be far-reaching in its effect upon the public mind, and cannot fail to have great results in advancing the claim of gas to be the best and most hygienic light in the home, and the most convenient, economical, and hygienic fuel both for domestic purposes and from the standpoint of the public health. If this be the result, it follows that the demand for gas and gas apparatus will largely increase, and so bring a rich reward to those interested in the undertakings who had the courage to promote the exhibition. These being my views, I think that the thanks of all interested in the gas industry are due to the gentlemen who, by their enterprise in promoting the exhibition and their organizing skill in planning and carrying it through, have produced so great a success.

From Middlesex.

The Gas Exhibition was, in my opinion, an unqualified success, and the arrangement of co-operation met the higher need of the gas consumer. Some of my consumers wrote me saying how highly they appreciated the courtesy shown to them by those in charge of the different rooms and apparatus. In the case of my Company, the business has enlarged; the call for gas heating fires has greatly increased.

I was much interested in the daylight conferences. The Chairmen were all men of experience in their professions, and the papers read were of a very high order. Looking back upon the exhibition, I do not think it would be possible to have improved upon the system and the arrangement. The only drawback has been the difficulty of obtaining from the manufacturers many of the appliances ordered by the consumers at the exhibition; but this perhaps may be taken as showing the excellent benefits that have accrued to the industry.

From Northumberland.

I had no opportunity during my visit to the exhibition to express to you personally my appreciation of the splendid results achieved, and I should therefore like to take this opportunity of saying that in my view the exhibition was the most effective national advertisement the gas industry has ever had.

From Suffolk.

In my opinion the value of the congress and exhibition in the gas industry is wholly for good. Never before have the public had brought to their notice how many and varied are the uses to which gas can be put, and how much this use tends to lighten household work, which is all to the advantage of the mother of many children. I arranged for most of our architects and all of our public officials to attend the exhibition, and they were well pleased with what they saw; and this, I think, must ultimately help us. I think there can be no question as to the soundness of the co-operative principle. The only blot on the whole scheme, if blot it was, was the want of sufficient attendants to explain to the public all they wished to know.

From Scotland.

I was well pleased and satisfied with my visit, and am of opinion that the whole venture should result in considerable benefit to the gas industry at large. It should also go a long way to popularize the use of gas for lighting, heating, cooking, and industrial purposes throughout the country; and the extensive notices which appeared in the local and other newspapers should help materially in disseminating knowledge of the use of gas. "Knowledge is power;" and I am strongly of opinion that where, as was the case at the recent congress, men of outstanding ability tell of the adaptability of gas as a power-producing and heat-giving agent, the ultimate result must be beneficial to that industry.

From Lancashire.

It is within my own knowledge that, while in some respects not free from criticism, the effect produced has been a kind of revelation of the value and increasing prospects of advantage which gas and gas appliances offer to the world. The exhibition of lighting was, with a few exceptions, a most remarkable manifestation of progress, and most impressive. The development of gas for industrial purposes was, however, in my view, one of the great successes of the exhibition, offering as it did a vista of immense extensions of great prospective value. It has convinced me personally that there must be in our own area a much wider field for useful service than I was previously aware of. If I may judge others by myself, it must have produced a general awakening and a strong incentive to greater activity in putting forward the value and the necessity of gas. But I feel strongly that, however great the immediate effect of the exhibition may be, something must be done to realize and continue it, otherwise its beneficial effect will, it may be feared, die down in time. It offers and calls for better organization, continued effort, and vigorous and thoughtful direction systematically maintained. Altogether, it was an exhibition to be long remembered, and will, I am confident, materially aid and help forward the cause of gas.

From the Midlands.

My opinion of the immediate advantage that the gas undertakings and allied industries of the country have derived from the holding of the exhibition is that it has undoubtedly done an immense amount of good; and I am sure that the ultimate advantage will be even better, if we look after the seed that has been sown. I believe that the immediate advantage to our undertakings depends to a great extent upon our own efforts—*i.e.*, upon our making the best use of the opportunities afforded us. Personally, my undertaking has derived a large amount of direct benefit already, inasmuch as the exhibition is responsible for our selling to one manufacturer a gas-furnace, which alone will consume 3 million cubic feet of gas per annum; and since the exhibition we have received an application from another firm in this town for a similar gas-furnace of double the capacity.

In addition to members of the Corporation and officials to the number of 45, who were personally conducted over the exhibition, a visit was also paid by a further 64 of our consumers; and I am confident that the results which will ultimately accrue from these visits are simply incalculable. As regards the co-operative principle, I am confident that it was absolutely sound and of advantage to the exhibition.

Finally, I may say that I questioned a considerable number of my consumers who went to the exhibition as to what they thought of it. Their replies were full of praise; the outstanding features in their minds appearing to be that it was refreshing to find that they were not badgered every three yards for an order, and also that the authorities had had the forethought to place plenty of seats about, so that the visitors could sit down and rest when they had seen part of the exhibition, and, when refreshed, proceed on their tour of inspection. Did the exhibition serve its purpose in interesting, informing, pleasing, and instructing the public? I unhesitatingly say it did.

From London.

The inquiries received include practically all classes of gas apparatus and appliances shown at the exhibition. Many inquiries have been made by architects, and also by builders, as to the latest designs in gas-fires for living-rooms and cooking and hot water apparatus for kitchens, also by those interested in the gas industry abroad; and the makers have benefited by orders from these inquiries as a direct result of the exhibition. All trades and professions appear to have made inquiries, many of which have resulted in business being done. Gas flashing signs have proved a new departure in the use of gas, and interest in these appears to have been aroused. Sugar boiling and cocoa and coffee roasting apparatus have received attention; while garage heaters have attracted those interested in the motor business.

I have not heard of any unfavourable criticisms regarding the exhibition. On the other hand, the consumers generally, and representatives of large firms, have freely expressed their admiration of it, and have stated in many instances that they were not aware that gas could be adapted to so many uses.

We have not heard any adverse criticism from customers, most of whom seem very pleased with the exhibition; and I think great interest has been aroused among the public by being able to see what gas can do, which they will remember for some time to come. Several consumers have made favourable comment on the absence of makers' representatives; thus being saved the worry of being continually canvassed.

I have come into contact with a good many consumers who have visited the exhibition, and the general impression is that it is a very comprehensive one, and many of them are surprised at the adaptability of gas for all purposes. One consumer who was instrumental in taking three parties, in all about 24 persons, was successful in converting three of them who had never used gas before. He informs me that they have given orders to their respective Companies—viz., Newhaven and Brighton—for gas lighting and cookers.

The third appendix contains letters on the subject of the press arrangements at the congress and exhibition.

United States Patents.—During the week ended the 14th ult., the United States Patent Office issued 907 patents—the largest number granted during any week in the history of the institution. The Patent Office receipts for April, May, and June were also unusually large, being $601,137 for the quarter. During the year ended June 30, an average of 1330 patent applications were filed, and 690 patents issued each week; while in the previous year 1310 applications were filed and 670 patents issued weekly. In the first half of 1913 the average weekly issue of patents was 660, compared with 730 for the same half of 1914. With the opening of the present year, 31,900 applications were awaiting action; while on July 1 only 22,400 remained to be passed—showing for the six months a decrease of 9500 in the applications pending.

ELECTRICITY SUPPLY MEMORANDA.

"It's an ill wind that blows nobody good." On the manufacturing side of the British electrical industry, it is thought that the sanguinary war in which practically all the nations of the Continent, as well as our own country, are engaged will, in the result, bring good to the doors of the home plant factories. For years past, there has been a tremendous export trade done by Germany in electrical plant and appliances; and many a generating station in this country bears lettered and other evidence of heavy and light plant having crossed the North Sea. Several of the electrical firms, too, doing a retail business here have been depending upon German and Austrian manufactures. Price has been the factor that has so largely turned the scale in favour of imported goods; so that electrical undertakings will now—at any rate for a period—have to meet the prices demanded by British manufacturers. There are electrical contracts now outstanding with Germany; and these will either have to be delayed or cancelled—if the latter, to the advantage of the home producers. Germany cannot conveniently export her manufactures to-day—either to this country, or to any other part of the world; and it will be, apart from any prejudice that the action of Germany has created the world over, a somewhat considerable task for that country to re-establish much of its export trade that has had such a precipitate interruption. Therefore, while the markets of the world are to-day sealed against Germany, they are all, excepting parts of the Continent, open to this country—if (and there is the rub) our mercantile marine and manufacturers choose to take the much smaller risk than Germany would incur of ships and goods falling as prizes into the hands of the enemy, who have apparently now only a small squadron of cruisers in the Far East, and (it is believed) only three small cruisers at large on the Atlantic. The risk is a point that some of our electrical friends appear to overlook.

The War, and Material Profit.

It is no use taking too large a credit, or building too big hopes, on the present or prospective trading position, as seen with the drawn sword in our hand, and the din of war in our ears. But in regard to our own country, "Electrical Industries" thinks that "the immense export trade in electrical goods which Germany has built up with this country and its Empire is already destroyed," and that "it is not likely to recover for a generation." So our electrical plant and appliance manufacturers are (according to that view) at liberty to contemplate a very good time; but if they are prudent, they will not attempt to live in the present on the profits (because they may prove to be without substance) they hope to derive prospectively from taking over business from Germany. We know enough about the strength of German industrial and commercial establishments and methods, and about the capacity of Germany for building-up wonderful organizations and ramifications, to be cognizant of the fact that, whatever may be the immediate feeling in the British Isles, and however considerable the task, they will not, as soon as there is an open door again, give up their export trade without making a fine struggle to regain, maintain, and extend it. Quite at one are we with our British electrical friends up to the point that the German trade with this country has received a sharp and big check; but as to the permanence of the export rupture here or elsewhere, we are not prepared to express any confident opinion. The best course the manufacturers of electrical plant and appliances can take is "to make hay while the sun shines" (if such metaphor can be applied to the present nebulous state of things) to the extent that the prevailing conditions will allow them to exert themselves to utilize the opportunity. The British Isles want to-day all the work and money-earning power that can be provided. But—— let us stop, and suggest to certain electrical commentators that they eschew superficiality in examining a serious position. We wish for our country at all times the greatest possible industrial activity, and the development of its prosperity to the utmost fullness. At the same time, the industrial and commercial relations of our own country with others must be surveyed with a practical eye.

Counting the Chickens—

"Murdered" Food.

The war, of course, will be responsible for much extravagant talking and writing; and we suppose that part of it must be forgiven in view of the excitement of the times. The writer of "Cooking and Heating Notes" in the "Electrical Times" has got the fever badly; and so the war is made the occasion for a senseless attack upon cooking by gas. The air is full of destruction and carnage. So he talks of the "barbarous methods" of the gas-cooker; of joints and vegetables being "murdered" by gas; and of the waste of nutritive value and flavour by the use of the same process. What baby innocence or childish babble! Yet it finds a place in a paper which claims technical classification. When we read such stuff and nonsense we think of the myriads of people who have dined privately and publicly, with exceeding great relish, day by day, upon food cooked entirely by gas. Have they done so because they have found the food "murdered" by the "barbarous methods" of the gas-cooker, and because they have found the nutritive value and flavour all dissipated? Experience speaks louder than the inflated language and the railing of the advocates of other methods, who only bring upon themselves the contempt of rational people, and a touch of sympathy here and there over the softness displayed by their vapourings. The real object of the article in our contemporary is to praise the method of slow cooking as a factor in kitchen economy. "For many years," we are told, "the gas interests have been encouraging the rapid cooking of food." Anyone with experience of the gas-cooker knows that—even a dolt would be aware of it—the control afforded by the gas-tap allows of food being cooked slowly or rapidly just as the cook desires. That "slow-cooking" which is advocated in order to secure kitchen economy would not be suitable for hotels, restaurants, and clubs where several heavy, diversified, and continuously served meals have to be provided daily. In regard to the use of electric-cookers for realizing the suggested household economy during this war, there is one obstacle, and it is that they are not in the kitchens of the masses. The domestic gas-cooker and the larger gas-range afford a breadth of operation with which the electric-cooker cannot vie, and that is the secret of all the silly writing, the apex of which is found in the "Electrical Times."

Berlin and Omissions.

Talking of the war, Berlin is always a sore point with our British electrical contemporaries; and they try hard to discount the popularity of the high-pressure gas system of lighting in the capital city of the country with which Great Britain has just now cause for having a certain difference. The "Electrical Times" has published an article on "Electricity Supply in Berlin;" and it is described as "an attempt to correct some widespread misconceptions." The use of the word "attempt" is highly judicious; the employment of the words "widespread misconceptions" very injudicious. We see that the article is by "An Englishman in Germany;" and the pious and humane hope is expressed that he "has since escaped." We also hope that he has, as there are a few points regarding which the "Electrical Times" might like to consult him. A strict censoring of information from Berlin is proceeding at the present time; and nothing but truth is supposed to now issue from that city, although the newspapers of all other nations, excepting possibly the "Electrical Times," urge the application of a plentiful number of grains of salt to any intelligence from that source. The article of an "Englishman in Germany" ought to have been censored; as it was not it must be treated to the grains of salt. In respect to public lighting the author says: "The choice of illuminant is to some extent determined by the private or municipal ownership of the gas and electricity works. . . . In Berlin itself the gas-works are municipal; and high-pressure gas is used to a considerable extent." There is truth about the high-pressure gas; but the "Englishman in Germany" has forgotten what we hope he learned at his mother's knee in the old country, that the omission of essential facts in a statement is the equivalent of what George Washington abhorred. It is true that Berlin owns municipal gas-works; it is also true that the Berlin Municipality enjoys a substantial share of the profits realized by the private enterprise which provides electricity for general and domestic purposes in the city. It is equally true that the Imperial Continental Gas Association (a private enterprise largely financed by British capital) provides the gas supply, from more than one works—the magnificent Mariendorf works among them, which are one of the prides of gas engineers the world over, and which are constantly undergoing extension in one part or another—for a considerable portion of the administrative area of Berlin and for numerous surrounding communes. The ordinary stock of the Association amounts to nearly 5 millions sterling, and its debenture stock to nearly 1¼ millions—a considerable part of which total capital is employed in Berlin. Why were these facts not stated by the "Englishman" who, it is to be hoped, has escaped from Berlin? Why did he make a representation suggesting that the gas supply of Berlin was entirely municipal, and that this was one of the reasons why high-pressure gas was so largely favoured; and why did he not state that the Berlin Municipality are concerned in the profits derived from the supply of electricity in the city?

Authentic Figures.

Proceeding we find that the "Englishman" states that on April 1, 1912, there were 40,659 gas-burners in the streets of Berlin, and only 1094 electric-lamps. These figures should give pause to electrical critics, who desire to discount the large favour that has been shown to high-pressure gas in Berlin, purely on account of quality, distribution, and constancy of light. But the "Englishman" goes on to state that many of the lamps included in the former figure "were, of course, of low candle power." Of course! But seeing that, at the same date there were—he does not state this—37¾ miles of roadway lighted by high-pressure gas-lamps (many more miles were also mapped out for similar treatment) the fact suggests that "many of the lamps" were likewise of "high candle power." "In the outer suburbs, gas has but little application"—says the "Englishman." It is truly remarkable then whence the Imperial Continental Gas Association have obtained their enormous revenue—gas in Berlin being municipal, and there being little application of gas in the outer suburbs. In the second six months alone of 1913, the Association laid 20 additional miles of mains; and every six months sees fresh extensions. Does the "Electrical Times" or its contributor think all this extra capital expenditure is incurred for the pure fun of the

thing? Now let us give two or three more figures which we should like confirmed or contradicted by "Englishman" or the "Electrical Times." The gas consumption in Berlin is expanding in a very regular manner. The advance for 1912 was about 5·6 per cent., and as much as 7·5 per cent. in the first four months of 1913. These figures apply to the municipal gas-works only. The *increase* in the gas consumers in the financial year ending March 31, 1913, was 60,071. At the end of December, 1912, the Berlin electricity works had only 40,914 consumers; so that the municipal gas-works gained more consumers in one year than there are consumers of electricity in the whole of Berlin. Will the "Electrical Times" publish *in extenso* these references to "Englishman's" article, and at the same time explain the at present cryptic meaning of this sentence in his effusion: "On the basis of facts, any reference to Berlin would be ill-advised in ebullitions of gaseous entbusiasm"? If the figures quoted by us cannot be denied—and we know they cannot be—then is it not about time the electrical papers stopped their foolish tactics in "attempting" to "correct" the truth?

Southampton Point Five Charge.

Sir John Snell, when plain Mr. John Francis Snell, was the principal witness in defence of the Long Eaton District Council's charges for electricity, in the action before Mr. Justice Sargant; and it will be remembered that his Lordship, in his commonsense judgment, did not see eye to eye with the electrical expert. There has been trouble at Southampton over the big difference in the charges for current for heating and cooking and for lighting—the contention being that the ½d. per unit for heating and cooking is not justified. Sir John was called in in conjunction with Mr. Ernest Edmonds, F.C.A.; and they have between them worked up a most elaborate report. We cannot go into it all. The reporters deal with the charge to the Tramways Department, and say the Electricity Department must take care to cover the cost of producing the energy supplied to the tramways. This is a sensible recommendation, which we take it every prudent business man would follow without being told. But experience shows that all electrical men do not, in the charges for current for different purposes, cover the cost of production. When Sir John and his collaborator speak of "cost of production," we hope that they include all charges, and do not lump some of them on to the backs of the lighting consumers, which may be the case (so far as the ½d. per unit for heating and cooking is concerned); for, in dealing with the rates for lighting, the opinion is expressed by the reporters, that it was a mistake to reduce them, having regard to the smallness of some of the lighting bills. Then we come to the kernel of the reference; and upon this Sir John and his colleague say "the heating rate of ½d. per unit, *if taken alone, cannot be justified*, but that it does not materially affect the total profits of the private supply." If this has any meaning at all, it is that, in fixing the charge of ½d. for heating and cooking, the care advised in respect of the fixing of the tramway rates has not been exercised, and as a business proposition it is incapable of standing securely on its own bottom. It also indicates that the amount of business obtained by the aid of the sop of ½d. per unit has not been so large that the total profits of the undertaking are adversely affected by it. But then the excuse is made that, when the effects of the ½d. per unit on the other departments are considered, the general improvement on the all-round profits justifies the policy. This is applying the whitewash pretty thickly. If the ½d. cannot be justified standing alone, then it cannot do the profit in bulk any good. Apparently Sir John intends the ½d. per unit to be taken in the same light as the teapot or caddy given by some little grocers to the purchasers from them of a certain number of pounds of tea. Bearing in mind that the ½d. standing alone cannot be justified, Sir John "estimates"—only "estimates"—that if every present lighting consumer took energy for heating and cooking at the ½d. rate to the same extent as the more limited number of consumers who purchased in 1912-13 (which is not likely ever to be the case) a larger net profit to the undertaking as a whole would be the result. Yet Sir John and his colleague show their profound faith, and accentuate the unjustifiableness of the ½d. per unit by urging the Council to seriously consider the question of displacing it by a fixed charge per annum, *plus* ½d. per unit for all metered consumption. In fact, they "strongly advise" that this course should be adopted. The report is a splendid example of a great capacity for taking the middle course. The reporters save their own faces, and at the same time they partially avert criticism of those who introduced a system of charge which, if taken alone, cannot be justified.

Loan Repayments and Depreciation.

A letter from Mr. J. Horace Bowden, the Electrical Engineer at Poplar, appeared in our columns on the 28th ult., in which he dealt with the subject of electrical loan repayments and depreciation. His attention may be directed to the following paragraph from the Southampton report (referred to in the previous note) of Sir John Snell and Mr. Edmonds: "Although, in our considered opinion, the annual loan repayments will in future, of themselves, be sufficient to meet normal depreciation, yet the maintenance, by contributions from revenue, of a depreciation and renewals fund of an adequate amount, from which abnormal losses can be provided (as was the case in 1912-13), is very strongly to be recommended."

ALKALI WORKS CHIEF INSPECTOR'S REPORT.

THERE was issued last week the fiftieth annual report of the Chief Inspector under the Alkali Works Regulation Act, 1906 (Mr. W. S. Curphey). The period covered is the year 1913; and the report is, as usual, followed by the reports of the various District Inspectors, and by that presented to the Secretary for Scotland.

Mr. Curphey begins his report by stating that the number of works in England, Ireland, and Wales registered under the Act was 1327, in 70 of which salt was decomposed with evolution of muriatic acid, so that the works are within the definition of "alkali works." In the remainder, operations were carried on which called for registration under section 8, or as one or more of the works enumerated in the first schedule of the Act. There was thus a decrease of three in the number registered as alkali works, and an increase of 25 in the number otherwise registered, as compared with 1912—the net increase being 22. There were also 167 works in Scotland registered under the Act; making in all an aggregate of 1494 for the United Kingdom. The number of visits to works last year was 6107, and of tests made 6344. The total number of visits and tests made during the year was larger than in 1912, in which there were 5980 visits and 6094 tests, due to the prolonged and widely spread coal strike during the spring. Not only were many works closed temporarily, but the railway train service was so disturbed that travelling was greatly interfered with. The number of separate processes of manufacture under inspection last year was 1997, compared with 1943 and 1903 in the two preceding years. These figures show an increase of 54 processes under inspection compared with 1912, and an increase of 94 as compared with 1911. They indicate the net result of various changes. Some processes previously under inspection were discontinued, while many came under inspection for the first time owing to the commencement of new operations. Mr. Curphey says this increase, requiring attention from the staff of inspectors, is again largely associated with the utilization of bye-products, as noted in previous years. The number of sulphate and muriate of ammonia works was increased by 14, and tar works by 13. These two groups thus accounted for one-half of the aggregate increase noted above.

The average escapes of acid gases from the various exits for waste gases recorded for the several districts show many fluctuations; but the general averages for the whole country vary but slightly as compared with the corresponding figures for the previous year. Much attention was given, as in former years, to the general condition of the plant in operation, as affecting the circumstances existing inside the works and in the surrounding neighbourhood. Further improvement occurred in this direction during the past year, associated in large degree with the additional adoption of mechanical appliances in place of manual operation of manufacturing plant, by which means the local intermittent escape of acid gases or fumes, to some extent incidental to the older methods using hand labour, was very largely or entirely avoided. No case arose during the year in which proceedings were entered for the recovery of penalty for infraction of the provisions of the Act as regards undue escape of acid gases, or for failure to use the best practicable means for the prevention of escape of noxious or offensive gases.

With regard to sulphate and muriate of ammonia and gas liquor works, Mr. Curphey reports that they continue to increase. The number of processes under inspection reached 649, or 14 more than in 1912, due in great measure to the erection of coke-oven works provided with recovery plant for bye-products. At the close of the year several of these works were in course of erection, pointing to a further increase during 1914. Through the courtesy of manufacturers, he is again enabled to present figures showing the quantity of ammonia (expressed in terms of sulphate) recovered in the United Kingdom as a bye-product in the various industries indicated in the following table:—

—	1913.	1912.	1911.
	Tons.	Tons.	Tons.
Gas-works	182,180	172,094	168,783
Iron-works	19,956	17,026	20,121
Shale-works	63,061	62,207	60,765
Coke-oven works	133,816	104,932	105,343
Producer-gas and carbonizing works (bone and coal)	33,605	32,049	29,964
Total	432,618	388,308	384,976

Mr. Curphey points out that in each group of works an increased production over 1912 is recorded. In the case of iron-works, this is due to the absence of disturbance from the coal strike which seriously affected the iron-smelting industry in the earlier year, and the production did not quite reach the level of 1911. All the remaining groups show a distinct increase over both years, and indicate a real advance in production. This advance is most marked in the case of coke-oven works, where an extensive increase in productive capacity occurred, partly from enlargements of plant in works already registered, and partly from the commencement of manufacturing operations in works registered for the first time during the year.

The "direct" methods of producing sulphate of ammonia were

put into further service during the year, both in coke-oven and in gas-works. Among the latter, some very high returns of sulphate of ammonia per ton of coal carbonized were claimed as compared with ordinary experience in working in the general way by distilling gas liquor. Mr. Curphey says: "This is of interest when considered in connection with the various possible losses of ammonia which may, and in too many cases do, occur during the handling and storing of gas liquor. Such losses are avoided by the direct process. Still it must not be forgotten that the conditions of carbonizing coal have an important influence on the yield of recoverable ammonia when making such comparisons." He adds that this matter of the loss of ammonia has been referred to in previous reports; but he emphasizes its importance to the producer, and mentions that it has been brought into prominence by Mr. Norton H. Humphrys, in a communication to the "JOURNAL." It is dealt with in more detail by Dr. Fryer, one of the District Inspectors, and an extract from his report will be found at the close of this article. Mr. Curphey says that loss of this valuable bye product, by the discharge of gas liquor into the most convenient drainage channel "is still unfortunately frequent in smaller and less accessible gas-works."

After reproducing, from a communication to the Iron and Steel Institute by Baron Evence Copée, given in the "JOURNAL" for Sept. 9, 1913 (p. 702), some statistics in regard to the production and use of sulphate of ammonia, Mr. Curphey remarks that the production of sulphate on the commercial scale from ammonia and sulphur compounds present in gas from coal carbonization without the use of sulphuric acid continued throughout the past year to engage attention, but no commercially successful results can yet be reported.

The noxious gases evolved during the distillation of gas liquor were dealt with by means in use during past years. Part was utilized in the manufacture of sulphuric acid, part for the recovery of sulphur by the Claus process, some was burnt and the resulting sulphurous acid neutralized by limestone, part was decomposed with formation of metallic sulphides, and much was absorbed in oxide of iron purifiers, which continued to be the means most widely used for dealing with these gases. The "heap" form gradually displaced the older form of box or brick-walled purifier. The study of the behaviour of oxide of iron during fouling and revivification was continued as opportunity offered during last year; and the Chief Inspector again records the efficiency of the labours of Mr. S. E. Linder, B.Sc., in the furtherance of this work.

Mr. Curphey reports that tar-works continue to increase rapidly, and now, in point of numbers, rank second only to sulphate and muriate of ammonia works, with which they are in many cases closely associated—both classes having to do with products from the destructive distillation of coal. The number of works registered during 1913 was 192—an increase of 13 as compared with the preceding year. This was chiefly due to the extended use of prepared tar for road purposes, and to the erection of new coke-oven works provided with the necessary plant for the recovery of bye-products from the coke-oven gas given off in the manufacture of coke. It is pointed out that, in the preparation of tar for road purposes, it is necessary to remove "water" which cannot readily be separated by mechanical means and a portion of the light oils also. The "water" is, properly speaking, gas liquor, and holds in solution the various odorous substances characteristic of that liquid. Its removal along with the lighter crude tar oils by boiling or sufficiently heating the tar is liable, therefore, to cause much local offence, unless effected under conditions providing for the condensation of the vapours and the proper treatment of the noxious gases driven off during this operation. The noxious gases evolved in tar works were satisfactorily dealt with during the year by combustion under proper safeguards, or by absorption in oxide of iron or lime purifiers, or in those containing a mixture of oxide and lime.

The Chief Inspector concludes his report by expressing his appreciation of the aid he received from his colleagues in carrying out the administration of the Act, and especially from Mr. Linder for his valuable services, not only in administrative work, but also in the research work connected with the inquiries alluded to in the report.

Mr. Curphey's report is followed, as usual, by those of the District Inspectors, which will be noticed next week. Meanwhile we reproduce below the special part of Dr. Fryer's report that is referred to above.

EXTRACTS FROM REPORT BY Mr. ALFRED C. FRYER, Ph.D., M.A., Inspector for the South and South-West of England.

It cannot be impressed too strongly on the minds of those managers of small gas undertakings who are not chemists that every ton of coal carbonized in this country should produce from 25 lbs. to 30 lbs. of sulphate of ammonia; and that if due care is exercised throughout the whole operation this production should be realized. Inefficient washers, leaky store tanks, and poorly constructed sulphate of ammonia stills carelessly worked are all points where serious loss of ammonia may take place. It is well for them to test their gas liquor for ammonia, both free and fixed; and it is most desirable to ascertain that the fume pipe from the saturator and the effluent from the still or boiler are not removing some of it to the drains. A thoroughly efficient still can reduce the loss to a decimal point per cent.

This, however, cannot be done with a hand-fired boiler, as it is a well-known fact that steam displaces ammonia from a liquid more easily than by a closed steam coil or external firing. In selecting a still it is prudent for them to err on the safe side, as wasteful work always results when the still is driven beyond its capacity. Variations of steam are inevitable, and loss of ammonia always results owing to insufficient boiling.

At one or two works in this district a thermometer is fitted on the liquor pipe at the outlet of the superheater, so that any decrease in steam temperature may be at once indicated and correction made. Comparatively few managers of small gas-works have grasped the fact that 40 lbs. of pure caustic soda, 53 lbs. of soda ash, or 37 lbs. of pure slaked lime cannot liberate more than 17 lbs. of fixed ammonia, and that a certain allowance must always be made for extraneous substances, and also for moisture in both caustic soda and lime. It is frequently calculated that gas liquor contains 20 per cent. of fixed ammonia; and if this is not all displaced by an alkali the loss must be serious. The alkali used is lime, caustic soda, or soda ash, and the latter is now employed at several works in the district. It requires a longer contact with the liquid, but it is cheaper and much easier to manipulate than caustic soda. "It is surprising that it is not more widely made use of," Mr. Norton H. Humphrys remarks in a paper on "Waste of Ammonia" in the "JOURNAL OF GAS LIGHTING," Sept. 16, 1913, (p. 764). If the gas liquor is stored for some months there is not only the risk of leakage and loss by evaporation, but some volatile compounds may oxidize and pass into the fixed form; and for this reason a larger quantity of alkali will in that case be required to liberate the ammonia. "Any sulphate maker," writes Mr. Humphrys in the valuable paper already referred to, "experienced in this method will say that he is accustomed to get better results with the comparatively fresh liquor at the start than when he has come down to the stalest."

Every year sulphate of ammonia takes a more important standing in agriculture. In many places where nitrate of soda was exclusively used, sulphate is now consumed. Belgium is still the country where chemical manures and sulphate of ammonia are used in greatest quantity per acre of cultivated land; and the following table, prepared by the "Comptoir Française du Sulphate d'Ammoniaque" [*vide* "JOURNAL OF GAS LIGHTING," p. 869, Dec. 16, 1913], shows, in kilogrammes, the total consumption of chemical manures and the consumption of sulphate of ammonia per hectare (2·47 acres) of cultivated land in several countries:—

	Sulphate of Ammonia		Chemical Manures.
Belgium	23·08	..	382
Germany	12·12	..	158
England	7·26	..	142
Netherlands	5·94	..	187
Italy	2·88	..	54
France	2·46	..	57
Spain	1·74	..	16
Austria-Hungary	0·44	..	48

This French Association finds that, in order to displace nitrate, the unit of nitrogen should be a trifle cheaper in sulphate; and it is most important to be careful that the quality of sulphate should be regular and good, properly dried, and with a small acidity.

Some few gas-works in the south and south-west of England dispose locally of their make of sulphate of ammonia; yet by far the larger bulk manufactured is sent abroad, although nearly all the works are situated in towns surrounded by agricultural districts. Statistics inform us that in England the consumption of sulphate of ammonia is only 24 per cent. of the production, while the United States, France, and Belgium consume more sulphate than they produce, and Germany, with a manufacture of about 500,000 tons, utilizes 84 per cent. of her very large output.

Work of the Illuminating Engineering Society.

The current number of the "Illuminating Engineer" contains a review of the work done by the Illuminating Engineering Society since its formation in 1909. During the five years of its existence, it has held 37 meetings, the total attendance at which approaches 3000, of whom approximately 60 per cent. were visitors. Upwards of 300 contributions were made to the discussions at the meetings, and more than 200 different people spoke or communicated remarks. The membership, which started with about 50, has increased to nearly 500; but it is pointed out that the time has now come when a greatly enlarged membership is required in order to carry out the important work before the Society and extend its activities. Arrangements are being made to largely increase the number of members throughout the Provinces; and among the representatives of the Society already nominated are Mr. Edward Allen, of Liverpool; Mr. W. D. Helps, Managing-Director of Messrs. James Milne and Son, Limited, of Leeds; Mr. J. G. Newbigging, of Manchester; and Mr. Alex Wilson, of Glasgow. The review is followed by a list of papers which have been read before the Society, and of the officers and members as at the close of June. The President is Sir William Bennett, K.C.V.O., F.R.C.S., and among the Vice-Presidents are the President of the Institution of Gas Engineers (Mr. John Bond, Gas Engineer and Manager to the Southport Corporation), his predecessor, and several gentlemen occupying prominent positions in connection with the gas industry, including Mr. F. W. Goodenough, the Controller of Sales to the Gas Light and Coke Company, who is Chairman of the Council.

EXTRACTING PRODUCTS FROM GAS LIQUOR.

A French patent has been taken out by MM. Louis Charles Bonneau and Victor Emile Hasenfratz for a process for the extraction of the products contained in gas liquor. The patent is No. 468,535 of 1914; and the following is an abstract translation of the specification.

In the processes hitherto employed, sulphur or prussian blue has been exclusively extracted; no industrial method having made it possible to extract simultaneously all the useful elements in the raw material. The method which is the object of the invention comprises four successive operations, which, owing to the choice of solvents, the efficacy of the reactions employed for the separations, and, finally, the order adopted to introduce the reagents, make it possible to reduce to a minimum waste in each operation, and practically extract nearly all the materials in the liquor. The operations follow each other as follows: (1) Desiccation of the liquor; (2) extraction of sulphur; (3) extraction of ammoniacal salts; (4) preparation of prussian blue.

(1) The liquor contains a little free ammonia (0 to 2 per cent.), which should not be lost. The liquor, therefore, is first desiccated; care being taken to collect the water of condensation. For this purpose, preference is given to an appliance consisting of a cylinder with double jacket and a current of steam circulating between the sides. The liquor to be dried is placed inside the cylinder and agitated during heating by means of paddles mounted on an axial shaft to which rotary motion is given. The steam and the free ammonia are sucked through an orifice in the inner cylinder by a pump, and then sent into a condensing worm.

(2) The sulphur can be extracted by simple dissolution; some volatile solvent, preferably a trichlorethylene one, being used for the purpose. To obtain this dissolution of sulphur, the diffusing apparatus of M. Charles Bonneau is preferably utilized. At the outlet from this diffusing and extracting machine a hot saturated solution of sulphur in the solvent is obtained. It is then allowed to cool, and a large portion of the sulphur is deposited in crystals. The solvent can then be separated for further work, or the liquid distilled to recover the sulphur it still contains in solution.

(3) The residue from the extraction of sulphur is put into a battery of diffusers and drained with tepid water to which the slightly ammoniacal water of condensation from the initial desiccation is added. When the drainage is considered to be sufficient, the liquid charged with ammoniacal salts is treated with lime in an apparatus for collecting ammonia, either in the form of aqueous solution or of salts; the requisite acid elements being added in the usual way. Another method consists in directly treating the mass of gas liquor itself, after extraction of the sulphur, with milk of lime. This operation gives a double result—the disengagement of the ammoniacal nitrogen, and the rendering soluble of the ferrocyanides.

(4) For the extraction of prussian blue the solid residue from the preceding operations is mixed with water and slaked lime. The mass put into large vats is then brought by means of a current of steam to a temperature of about 100°C. Under the action of lime, the ferric ferrocyanide or prussian blue contained in the liquor is transformed into soluble calcium ferrocyanide. It is allowed to deposit, and the liquid is then decanted in separating it from the insoluble part of the gas liquor. This solution is brought to boiling-point in vats heated by a current of steam; and then potassium chloride is added. A crystalline precipitate, formed of double ferrocyanide of calcium and potassium very slightly soluble in water, soon deposits. The precipitate, of considerably greater density than the liquid, quickly collects on the bottom of the vat. After cooling, the liquid is separated from the precipitate by means of a syphon, and the precipitate washed in cold water and decanted a second time. The vat is filled with water and brought to boiling-point; and then it is treated with a slight excess of sodium carbonate. The double ferrocyanide of calcium and potassium is decomposed, and there are formed an insoluble calcium carbonate, which precipitates, and an alkaline ferrocyanide, which remains in solution. After cooling, the liquid is separated from the precipitate by decantation. This liquid is then poured into a solution of ferric salt, and there is an abundant precipitate of pure prussian blue or ferric ferrocyanide, which is washed with water and collected in filter-presses. The cakes of prussian blue from the presses are dried in ovens at a temperature of 30° to 35°C.

The final solid residue from the gas liquor contains a considerable percentage of iron oxide.

Bye-Product Coke-Ovens in Russia.—The Unites States Consul at Odessa reports that there are in South Russia ten plants owned by nine firms for the production and utilization of coke bye-products. In the first nine months of 1913 these firms were operating 887 coke-ovens producing bye-products, besides a large number of the old type. The increase in the last four years in these ovens was 563, or 15·8 per cent. In 1912, 5,689,411 tons of coal were consumed to produce 4,252,697 tons of coke, as compared with 2,774,733 tons of coal to produce 2,020,831 tons of coke in 1903. Sulphate of ammonia is beginning to be used in Russia as a fertilizer; but most of it is still exported. The pitch is used mainly, if not exclusively, for the production of briquettes, and the heavy oils for the impregnation of railroad sleepers.

HIGH-PRESSURE STREET LIGHTING IN QUEENSLAND.

Mr. H. H. Wedd, of Brisbane, Queensland, sends a copy of a night photograph which he took in one of the streets of the town by the light of a Keith 84-inch high-pressure 4500-candle power gas-lamp. He remarks that the photo, which shows part of

Victoria Place, South Brisbane, was taken on a dark, moonless night by the light of a Keith three-burner lamp near the middle of the crossing. The photo is, Mr. Wedd assures us, in no way faked or touched up.

FLUES FOR GAS APPLIANCES.

This subject has lately been dealt with by Mr. R. P. Perkins, of Philadelphia (Pa.), in the "Gas Age" of New York. First of all he established the fact that a flue for a gas appliance is in reality a ventilator, and that it should fulfil the following requirements: (1) It should carry away all the products from the burner without causing an unnatural pull on the appliance; (2) it should always be ready for action, and should not take any considerable amount of heat to cause a draught; (3) if the draught in the flue is stopped, it should not interfere with the free and natural burning of the appliance; (4) flues should be so constructed that the maximum speed should be given to the products, so that the heavier gas will be carried along mechanically with the air. The first and third of these conditions are met by properly placing a "check draught" fitting; the second condition largely depends on the construction of the cowl or other means for creating a mechanical draught; and the fourth upon the size of the flue. There are numerous types of cowls, chimney tops, and so-called mechanical pumps on the market, which purport to create a draught by their construction. Practically all of them work well if they are placed above the roofs of surrounding buildings, and are not affected by local air currents. The eddy currents around buildings are as apt to be up and down as horizontal; and most cowl and ventilator tops are designed for a horizontal wind. If a wind blows against a wall, it creates a positive increase in pressure in the region of the wall, and causes eddy currents along the wall that will affect the draught.

Material to be Used.

In regard to the material to be used for ordinary flue connections, most of the standard forms are available. The elbows may be three, four, or five piece adjustable, as may be desired. The adjustable elbow saves labour and improves the appearance of the flue. T-pieces are usually furnished in 2-feet sections, fitted with a plug and with the inlet set at an angle. All vertical flues should be provided with T-pieces and plugs at the bottom, so that any dirt falling from the vertical run will not block the passage, but be trapped in the plug and easily removed. The vertical sections of pipe should be supported, so that none of their weight is carried by the horizontal runs to which they are connected.

Length of Flue.

When the vertical runs of pipe go up inside buildings, they should be carried above the highest part of the roof, if possible, as this gives a better draught and allows the cowl to act properly. But too long a flue allows too much radiation, and the consequent cooling of the products, which practically eliminates the action of the flue. It is necessary, however, to carry the flue high enough to cause a sufficient up-draught; and this should be obtained in 4 feet, or two joints, of pipe. This last statement is a rather

empirical one, and depends very much upon local conditions. It is a safe guide, however, as a pipe of this length should not give trouble, which a longer one will. A flue pipe should be run above the roof of the building, if practicable, provided it does not take more than 10 feet of pipe to accomplish it. Otherwise it should be as short as possible to create a draught. The vertical run of pipe outside the building should be kept as far from the walls as can be managed, so that the cowl will not be affected by the eddy currents. If the inside edge of the cowl is kept about 6 inches from the wall, it should clear most of these currents. The farther out the better; but 6 inches is the practical limit. These runs should be supported by hooks.

Chimney Connection.

In running a flue to the outer air, various schemes may be used. Of course, the flue may be run through the wall. In this case, if the wall is brick there should be a sleeve provided so that the flue would not be broken or rust in the wall. If sleeved, it could be easily removed. The ends should be covered by wall plates. In many cases it is not possible to cut a hole in the wall, and a window will have to be used. There are two good ways of going through a window. The first is to remove a pane of glass and replace it with tin, arranged with a hole for the flue. In this case it is necessary to make a tight joint between the flue and the tin pane, so that there will be no leakage, and to nail fast the sash from which the pane has been removed, so that the flue cannot be accidentally broken. The second method is to place a board above the upper sash, and, nailing it in place, run the flue through it. This has two distinct advantages, though it does not look so well as the first plan. It allows of the opening of the sash, and it does not permit of the closing of the window tightly, so that extra ventilation is automatically provided for the room.

In connecting gas logs or asbestos front grates in a fireplace be sure first that you are in a real fireplace, and actually have a flue. All dampers and checks must be removed, so that there will be no chance of closing-up the flue, and then proceed as described in the last paragraph.

Dampers and Check Draughts.

It is at times necessary to connect two appliances—one coal and the other gas—to the same flue. These should never enter at the same level. A damper should be supplied on the coal appliance, so that it may be shut off when not in use. No damper should be placed on the flue from a gas appliance if it is possible to avoid it. It is, however, necessary at times to put dampers on gas-flues. When this is the case, a damper with a hole not less than 1 inch in diameter should be used above the check-draught fitting, so that there will be a certain draught, even if the damper be closed. If two gas appliances are to be connected to the same flue—say, a water-heater and the oven of a range—they may be connected with a T-piece; but each must also be provided with a check-draught fitting.

Connecting Several Appliances.

In connecting one or more appliances to the same flue, it must be remembered that a gas heavier than air is being dealt with, and that if cooled to anywhere near the atmospheric temperature it will fall and effectively block off the flue or back into a room other than the one in which the appliance is burning. It is well, if possible, to run a separate flue to every gas appliance, and in the case of using a flue designed for a coal-stove, a pipe may be run up inside it and properly capped at the top.

Special conditions are to be met with in apartment houses where an appliance such as a gas-range is connected on each floor, and a flue connection made from these or from canopies over them. A strong draught should be established in the main flues, so that the products and smells from the cooking may be properly carried away. If possible, this flue should be connected to the ventilating system of the building or a special suction fan placed in it. No dampers should be allowed on any connection to this flue. It is not always practicable to place a fan on a gas-flue, even in an apartment house. Sometimes the flue from the heating system or the boiler may be in the same chimney as the flues from the kitchens, when they may be warmed sufficiently to cause a good draught.

Maintaining a Draught by Pilot-Light.

A pilot-light in the bottom of the flue may be used to keep the draught going and the flue warm. In all cases, excepting where mechanical draught is used, each flue carrying gas appliances should be properly topped by an approved cowl so that any wind blowing will keep a draught established. It is well to use a separate flues for all appliances connected, and run them into a breeching at the top of the chimney, and place a large cowl over the breeching. The pilot-light may be placed in the main flue so that all flues get part of the heat. The size of the flue, its length, and the number of connections govern the size of the light. It must not be supposed that an ordinary burner is all that is necessary to create a draught in a large flue. The burners must supply enough heat to overcome the radiation of the flue and keep the column of air moving. It may take 30 cubic feet of gas per hour to do this. The economy of this system over a mechanical fan is largely in attendance and maintenance.

Discharging Inside the Building.

There is one more set of connections which have an application in flue work—viz., those that may discharge within the house itself. It is at times better, from local conditions, to run the flue into a stair well, hall, or unoccupied attic, than to attempt to run it outside the building. This system should not be employed when much gas is to be burnt. It must be first ascertained that the products will not do any damage, and that a good ventilation of the room into which the products are discharged will be assured at all times. The construction of a flue of this type should be the same as for other types of flue, even to the cap.

Capacities of Flues.

The following table gives a rough estimate of the sizes of the flues necessary to deal with various quantities of gas:

Cubic Feet.	Size of Gas Supply Pipe.	Size of Flue Area.	Diameter of Pipe.
0 to 10	⅜ in.	3·16 sq. in.	2 in.
10 ,, 50	½ ,,	7·06 ,,	3 ,,
50 ,, 100	¾ ,,	12·56 ,,	4 ,,
100 ,, 150	1 ,,	19·63 ,,	5 ,,
150 ,, 250	1½ ,,	28·28 ,,	6 ,,

The flues from canopies above ranges and other appliances should not follow the figures given, but should be as large as possible, so that all smells may be carried off and good ventilation obtained.

The use of flues in factories on large appliances is not so necessary as in dwellings. It is, however, well to connect all appliances with flues, though there is more moving about and usually better ventilation. Special types of canopies may be used above large appliances to carry away the heat and smoke.

Precautions.

It is recommended that all flues should be tested with powdered resin, or some similar smoke-producing substance, to make sure that they work properly. All dampers or other checks that may be found in flues where a gas appliance is connected should be removed or fastened open, if allowable, in such a way that they cannot be disturbed and closed accidentally. In general, all flue connections should be as short as possible inside the rooms as well as outside the building.

It should be borne in mind that a gas-flue is a ventilator, and as such is a safety device; and care should be taken to see that it is at all times as efficient as possible. As much care should be taken to see that it works properly as is used to make the appliance to which it is attached do so. The proper use of flues will increase the sale of gas appliances, and make the conditions of living better in the homes and rooms in which they are used.

Example.

Let us now suppose we have to make a simple type of flue connection to a bath-room heater, and passing through a window in which one pane of glass has been removed and a sheet of tin substituted for it. We have connected our appliance, and have placed a check draught at the proper height; and the position of our flue outlet from the room is fixed. So we have two given points to work from. The flue should be run as directly as possible, and the flow of the gas should be up at all times—that is, there should be an upward trend to all horizontal runs in the direction in which the gas is flowing. Not less than 1 inch rise in every 2 feet section is sufficient. We may therefore figure the height of the vertical of the flue necessary above the check draught to give this condition. An elbow (preferably one of the flexible type) is provided and put in place, being bent to the proper angle. A T-piece is placed in its proper working position, and the horizontal length of pipe is run, supported by wires. A joint of galvanized pipe is now put on outside, and an approved cowl, and a test is made to prove its proper working. If it works, all joints are tacked together and wired-up. If it does not work, an additional length of pipe is added to the outside flue, and then another test made; and so on till the proper result is obtained.

Gas-Burner on a New Principle.

The following paragraph appeared in the "American Gas Light Journal" for the 3rd inst.: "The Engineering Research Laboratories of the Welsbach Company announce that the application of a recently discovered principle of gas-lamp design has resulted in the commercial development of a type of lamp by which operating costs are practically cut in two. This parallels the development of the nitrogen-filled tungsten lamp in the electrical field. In addition, the necessity for the use of cylinders is avoided, and the new type of burner requires attention and adjustment at very infrequent intervals. It is noiseless and non-carbonizing, very inexpensive, and simple of construction; may be applied in fixture design with almost the same flexibility as the electric incandescent lamp, and all fixture discoloration is eliminated. The new lamp operates on novel principles, in that the kinetic energy of the gas is fully utilized to secure uniformity of mixture, which is accomplished by providing scientifically designed stream-lines for the gases. This development is the culmination of three years' research in connection with the behaviour of gases in the bunsen burner, and it is the first exhaustive work ever done in this direction. The importance of the principle discovered is illustrated by an experiment upon the existing burner, which by mere chance happened to approach quite closely to the design found to be scientifically correct. The alteration of one or two apparently insignificant features increased the efficiency over 70 per cent., and rendered the cylinder superfluous. The necessity for extreme care in design lies in the fact that gases highly expanded and heated are greatly affected by conditions of an almost infinitesimal nature."

IRISH ASSOCIATION OF GAS MANAGERS.

Meeting in Dublin, Aug. 11.

THE difficulties to be met with in travelling, and other causes arising out of the existing situation, were, as was only to be expected, responsible for the absence of a good many members and visitors from last week's annual meeting of the Irish Association of Gas Managers. But, when the circumstances are considered, the muster in the City Hall of Dublin on Tuesday morning, when the President (Mr. P. J. Fitzpatrick, of Maryborough) rose to deliver his Inaugural Address, must be regarded as quite satisfactory. The address, and the three papers read, though the latter did not evoke a great deal of discussion, proved sufficient (with a short break for refreshments, on the invitation of the President) to keep the members occupied until well on into the afternoon. The evening and the following day were devoted to the "social side" of the meeting—a well-attended dinner and excursion being enjoyable sequels to the business portion of the proceedings.

The Meeting was held in the Council Chamber, City Hall, Dublin—Mr. P. J. FITZPATRICK, of Maryborough (the President), in the chair.

A WELCOME.

The TOWN CLERK (Mr. Henry Campbell) said he had been requested by the Lord Mayor of Dublin to express his great regret that, owing to high pressure of work in connection with public affairs, he was unable to be present to accord a hearty greeting on behalf of the citizens, who were glad to see the Association, and to offer them the accommodation which the City Chamber would afford. One thing they were all sorry for was that the attendance, as was to be expected, was small, in consequence of the troubles now existing. Having regard to all the circumstances, he thought it was wonderful that so many members had been able to turn up. The citizens hoped that the Association would spend a pleasant and profitable time in Dublin. The Lord Mayor had directed him to say that, as soon as he could spare time later on in the day, he would be with the members to offer them a welcome.

The PRESIDENT expressed the indebtedness of the members to Mr. Campbell for opening the meeting.

REPORT OF THE COMMITTEE.

The HON. SECRETARY and TREASURER (Mr. George Airth, of Dundalk) then read the report of the Committee, which opened with a congratulatory remark on the subject of the continued prosperity of the Association. The report went on to say:

The meeting in Belfast was a great success, and well attended for a meeting in the North. The Committee are considering whether it would or would not be best to hold all the meetings in Dublin, as, by having them in practically the centre of Ireland, a larger number of members would attend, and thus further help on the objects of the Association. At the meeting in Belfast, it was decided to give the following Past-Presidents of the Association gold medals, in commemoration of their year of office. This has been done, and grateful letters of thanks for the generosity of the Association have been received from Messrs. J. G. Tooms (Buenos Ayres), S. B. Langlands (Glasgow), and W. A. Reid (Malta). During the year death has claimed one of the original members—Mr. E. Stears, of Lisburn, who was the first Chairman of the North of Ireland Association of Gas Managers, and by whose death Ireland is robbed of one of the foremost gas managers of his time. His son is a member, and to him and his family is tendered the deepest sympathy of the Association. Also the death, before he had reached the prime of life, of Mr. George Lennon, of Dungarvan, who was a member of the North of Ireland Association, and a regular attendant at the meetings until his health failed. Another member—Mr. George Mearns, of Banbridge—came to a sad end, owing to an accident on his works. Mr. Mearns was a young member, but none the less well liked and appreciated by all who knew him. The Committee feel that the Association should do something for his bereaved widow and children, and asked the members to vote a sum of £10 towards this deserving fund. The desirability of postponing or abandoning the meeting was considered by the Committee; but as all arrangements had been made, it would have meant financial loss to countermand them, and it was decided to let the meeting take its course. The abstract of accounts and the Auditor's report showed a balance of £65.

The report was adopted, on the proposition of Mr. JAMES WOODS, seconded by Mr. C. W. STOTT (Parsonstown), both of whom agreed that the proposal with respect to the family of Mr. Mearns was an excellent one. Mr. Woods suggested that a subscription list might be opened by the members, in addition to what the Association were to do collectively.

REPORT OF THE AUDITOR.

The AUDITOR (Mr. G. W. Norman, of Dublin) next read his report and an abstract of the accounts; and these were adopted, on the proposal of Mr. W. NESBIT (Ballymena), seconded by Mr. J. PATERSON (Waterford).

REPORT OF THE DISTRICT REPRESENTATIVE.

In the absence of Mr. W. R. Roberts (Newtownards), the HON. SECRETARY read a report from him, in the course of which he said: "As the representative for the Irish Association of Gas Managers on the Council of the Institution of Gas Engineers, I have very little to report that is of any interest to the members of the Irish Association, further than that considerable research work has been done during the year by the Institution, which I feel sure the gas industry will find beneficial in the near future—particularly in improving fire-clay material."

ELECTION OF DISTRICT REPRESENTATIVE ON THE COUNCIL OF THE INSTITUTION OF GAS ENGINEERS.

Proposed by Mr. C. B. OUTON (Inchicore), seconded by Mr. THOMAS HORNBY (Longford), the meeting unanimously appointed Mr. J. E. Enright, of Tralee, district representative of the Association for the coming year on the Council of the Institution of Gas Engineers.

PRESIDENTIAL ADDRESS.

The PRESIDENT afterwards proceeded to deliver his address, which will be found on pp. 333-5 of last Tuesday's "JOURNAL." At its conclusion,

Mr. R. YOUNG (Youghal) proposed a hearty vote of thanks to Mr. Fitzpatrick, who, he said, had given them much food for thought. No doubt there were many things in the address which some of them would regard as open to controversy; but the President was in the happy position of being able to say what he liked without fear of contradiction. On the other hand, there were, of course, many statements which were well worthy of consideration—especially by the managers of small works.

MUNICIPAL ELECTRICAL COMPETITION.

The HON. SECRETARY, in seconding, said the President must not feel that the size of the audience was any indication of the extent of their appreciation of his efforts. The small number present was owing to unfortunate and exceptional circumstances. It was caused by the fear of the "German bomb" thrown among them a short time ago. However, a larger number of the members should have heard the sound of the hand-clasp between the North and the South, and have come to Dublin to the meeting. With reference to the remarks of the President as to the coal market, he (Mr. Airth) had made inquiries, and from what he could hear from the miners—and he himself came originally from a coal-mining district—the men asserted that they did not get more than 20 per cent of the rise. The market, he believed, had gone down considerably since he bought coals some three months ago. He had heard of a place near Dundalk which had secured a reduction of from 1s. 6d. to 1s. 9d. per ton recently for the same coals as he was using, so evidently he had bought his too early. The President said there was a large field for coal gas of good calorific value. Possibly what was meant was a gas of low illuminating power; but unfortunately many of them were up-against growing electrical competition, and those who were under statutory powers had to keep up to the prescribed illuminating quality. He agreed with the President that Home Rule was coming, no matter what Government was in power; but he did not agree with him in his remarks about municipal finance. He did not think that any municipality should be allowed now to come into the market and interfere by means of electricity with the supply of gas, or *vice versâ*. He did not believe, for instance, that one really got the same service from a municipality as from a private company. The odds were that the manager under a town council or an urban district council would not be so particular as where he had to make dividends to pay to shareholders, and one did not get the fair and above-board competition that would be the case if two rival companies were supplying the public with the commodities which each had to sell. With up-to-date methods of manufacture, and a readiness to oblige and advise their customers, they had nothing to fear from the introduction of electricity either as a light-giving or a power-giving agent. This remark, however, referred to company competition; and he would have to withdraw it to some extent if he included municipal competition. Immediately municipal electrical competition appeared in the field, the gas company lost the street lighting, and the lighting of municipal buildings, reading-rooms, dispensaries, and all other places which it was within the power of the local authority to take from the gas company. In his own case, the result of electric light being introduced into the town was a drop during the first year of from 20 to 22 per cent. in the make of gas. This brought him to an allusion to some of the "pin-pricks of the enemy," as he had found them. The President had pointed out that in many towns the gas companies were among the largest ratepayers. The Urban District Council of Dundalk possessed an electricity works on which it was admitted that they had up to the present time spent £24,945; and the rateable value of their property was £50. On

the other hand, the capital of the Gas Company was £22,000; and they paid in rates £1034. This was brought out in connection with the recent inquiry mentioned by the President. It was argued that the electricity undertaking was a new concern, and should not pay heavy rates. It would afford him pleasure to deal with the figures given by Mr. M'Gahon, because he knew gas managers would be much interested to hear how they were getting on in Dundalk, which was regarded as a wonderful place so far as electricity was concerned. For the first nine months, the gross earnings amounted to £2490, and the working expenses to £1267. For the next twelve months, the gross earnings were £3728, or £1400 more; while the working expenses reached £2224, which was a rise of £1000. In the first year, a great deal of the money was put to capital account, so that they came out with a deficit of only £163. For the second year of working, Mr. M'Gahon had simply doctored his figures. Instead of an income of £3838, the Auditor said it was £3728; so that there was £110 to come off there. He also took into account the balance from the previous account, £187; and these two items added together made what the "Electrical Times" admitted was a loss of £297. They would have to add to this sum already lost of £297 an amount of £305 to pay interest on the capital not accounted for, as they only accounted for £20,000, while they had spent £29,000 on the undertaking to date. So that the loss was nearer £600 than £2. So much for Mr. M'Gahon's figures. However, in spite of what he had shown was the state of affairs, they were going to do one of the most marvellous things ever done in Dundalk. At the present moment, it cost the undertaking 3·423d. for every unit they sold. But they had borrowed another £21,000, and were going to sell to the Great Northern Railway 480,000 units per annum at 0·9d. per unit, 320,000 units at 0·7d., and any quantity above this amount at 0·5d.—and make a profit. He did not know how it was going to be done; but perhaps the general consumers might be made to pay more, to prevent a loss. The advice given by the President to their young men was extremely good; and it might even do good to some of those who were perhaps beginning to get a little bit lazy in life if they rubbed up their chemistry and other subjects. It was certainly only right that owners of gas-works, however small, should allow their gas managers to come to the meetings of the Association, and pay their expenses. He thought they should ask the Committee to make a strong appeal to all gas undertakings in Ireland, irrespective of size; and he would go so far as to suggest that the Association, on their part, should admit free those managers who felt that they could not fairly afford to pay the subscription, because of the smallness of their works and the uphill fight they had. With regard to the question of technical instruction, of course, the smallness of most of the Irish works had to be remembered. He agreed with the President that such instruction as he had referred to was badly needed; and he (Mr. Airth) had induced his Company to offer to pay the fees of any of their plumbers who wished to attend classes in Dundalk, in whatever branch they chose, in the technical college, subject to his approval. The fees were paid, and a small grant was made to the men, according to the nature of the report they brought back from the technical schools. He agreed with what the President had said on the subject of good comradeship between the gas managers of the country. In conclusion, he remarked that the secretarial work was to him a labour of love. He seconded the proposal that a hearty vote of thanks should be passed to the President for his excellent address.

The vote was carried by acclamation; and the PRESIDENT briefly acknowledged it.

OFFICE BEARERS AND NEW MEMBERS.

Messrs. J. O. SCOTT (Edinburgh) and Mr. C. MAHOOD (Glasgow) were appointed Scrutineers; and they subsequently reported the following unanimous elections.

President.—Mr. J. E. Enright, of Tralee.
Vice-President.—Mr. W. Nisbet, of Ballymena.
Members of Committee.—Mr. J. Taylor, of Coleraine; Mr. T. G. Reid, of Ballina; and Mr. R. Young, of Youghal.
Auditor.—Mr. G. W. Norman, of Dublin.
Hon. Secretary and Treasurer.—Mr. George Airth, of Dundalk.

New Members.—Mr. Samuel Moore, of Dromore (co. Down); Mr. C. F. Lockington, of Cavan; Mr. J. O. Halliwell, of Mullingar; Mr. R. Kneeshaw, of Clonmel; and Mr. H. M'Elwee, of Athy.

Mr. ENRIGHT, in returning thanks for his election as President, said he would take the opportunity of associating himself with the remarks that had been made in regard to the working of the Association, good comradeship, and attendance at the meetings. Some two or three years ago he read a paper in which he dealt pretty strongly with this matter; and it was his intention, as far as might be in his power, to lift the Association out of the rut it had got into, and make it more popular and more useful to the members and to those who employed the members, so that the meetings might be better attended. He hoped in his new position to equal, as nearly as it was possible for him to do, the conduct of his predecessors in the chair.

PLACE OF NEXT MEETING.

Mr. ENRIGHT proposed that the meeting next year should be held in Dublin; remarking that this was the most get-at-able centre for them.

This was unanimously agreed to—the PRESIDENT expressing the opinion that all the meetings should be held in Dublin.

READING OF PAPERS.

The reading of papers was then proceeded with; the first being one by Mr. C. B. OUTON (of Inchicore), dealing with "Recent Working Experiences of 'Selas' Installations." This will be found on p. 398. The author extended a cordial invitation to the members to visit the Kingsbridge installation, or the Inchicore one, or both, and promised to conduct parties over, if they would name their own time. The members were able to inspect one of the lamps, which had been brought to the meeting.

Mr. H. M'ELWEE (Athy) followed with a contribution in which he set forth some of his "Experiences in Australia." [See p. 399].

The last paper to be read was on "Economical Street Lighting," by Mr. MALCOLM LITTLEJOHN, M.A., B.Sc. (Glasgow). This was accompanied by a large number of lantern slides depicting lighting installations, and some specimens of various appliances referred to.

Mr. C. B. TULLY (Hythe, Kent) had prepared a paper on the "'New' or 'Double' Gas for Small Works;" but most unfortunately the unsettled position of affairs prevented him from journeying to Dublin to read it. The members present therefore agreed that this communication should be left over, so that Mr. Tully might himself present it at the next meeting of the Association.

At a break in the reading of the papers, the members and their lady friends, on the invitation of the President, adjourned to the Dolphin Hotel for light refreshments.

THE PRESIDENT THANKED.

Mr. ENRIGHT remarked that they had now reached the end of the business proceedings; and he had very great pleasure in proposing a vote of thanks to the President for the able manner in which he had conducted the proceedings. He had done everything in a way which was worthy of the position he occupied.

Mr. H. W. SAVILLE (Drogheda), in seconding, said they had had a pleasurable time, and the President had fulfilled all their anticipations.

The vote was carried heartily; and the President voiced his appreciation of it.

THE LORD MAYOR'S UNAVOIDABLE ABSENCE.

The HON. SECRETARY stated that the Lord Mayor (Dr. L. G. Sherlock) had that day attended three or four conferences, including a very important one dealing with the prices of food stuffs, which prevented him from being present at the meeting.

The members then separated, to meet again later on in another place.

The Dinner.

In the evening the annual dinner took place at the Gresham Hotel. The President was in the chair; and what would in any case have been an enjoyable evening was rendered still more so by the presence of a number of ladies. An excellent programme of song, recitation, and juggling was interspersed with a few short speeches.

After the honouring of the Loyal Toast,

Mr. OUTON presented to Mr. Fitzpatrick the President's Medal; remarking that he was sure that gentleman would always have very pleasant recollections of his year of office. It had been thought that there should be something tangible to remind him of the event. Therefore he had been asked to bestow upon him, on behalf of the members, the President's Medal of the Irish Association of Gas Managers. He (Mr. Outon) himself had one of these medals, which he valued greatly. He had much pleasure in presenting Mr. Fitzpatrick with this token of the members' sincere admiration of his conduct in the chair that day; and he trusted that the President might be spared for very many years to wear it. [Applause.]

The PRESIDENT said he was unable adequately to express his thanks to them for the honour they had done him. He would be proud to wear the medal as a memento of one of the best times of his life.

The toast of "The Irish Association of Gas Managers" was entrusted to Mr. A. HARRISON, and responded to in felicitous terms by Mr. GEORGE AIRTH. "Kindred Associations" was submitted by Mr. C. W. STOTT, who remarked that the men connected with the gas industry of the United Kingdom would play a noble part in the terrible European war, for many of them had gone to serve their country. He hoped that when things had settled down once more, they would see many of their old friends again at the Irish Association meetings. Mr. J. PATERSON replied in feeling terms; and then Mr. G. W. NORMAN proposed "The Ladies and Bachelors," to which Mr. CHARLES S. CAMPBELL, B.L., responded. "The Prosperity of Dublin" was next submitted by Mr. J. E. ENRIGHT, who coupled with it the names of the Lord Mayor and the Town Clerk. He voiced the thanks of the Association to the authorities for the use of the City Hall for the meeting. Mr. C. S. CAMPBELL (as a son of the Town Clerk) replied also to this toast, and assured the members that they in Dublin were pleased to see them. They were delighted to know that such an Association could be carried on successfully, and still more delighted to see the unity and good fellowship

which obtained in it. They hoped to have the members in Dublin on many occasions in the future.

A Delightful Excursion.

The members and friends parted after dinner with pleasurable anticipations of Wednesday; and in the event these anticipations were realized to the fullest extent. In motor-brakes, the party (which was again graced by the presence of the ladies) made an early start on a drive by way of the Scalp, Enniskerry, and Rocky Valley, to Glendalough, where dinner was provided at the Lake Hotel. Some time was spent at Glendalough, in enjoyment of the magnificent scenery, which, bathed in bright sunshine, was seen absolutely at its best. A visit was also paid by some members of the party to St. Kevin's Bed, on the far side of the lake; others, however, found it inaccessible. The drive was resumed, through the Vale of Clare, Rathdrum, and Newtownmountkennedy, to Bray, where tea was served in the International Hotel. Subsequently a return was made to Dublin, this bringing to an end an excursion which had been a complete success all through. The admirable arrangements of the Hon. Secretary (to whom, as well as to Mr. Norman, the Association owe much) were as admirably carried out by those to whom they were entrusted; and, as already remarked, the weather was everything that could be desired. It is safe to say that Glendalough will long remain a pleasant memory to those who visited it last Wednesday.

GAS POWER IN CHEMICAL WORKS.

At one of the Spring meetings of the Manchester Section of the Society of Chemical Industry, Mr. T. Roland Wollaston (a letter from whom appears in our "Correspondence" columns to-day) read a paper on "Power and Heat Costs in Chemical Works;" and he sends a reprint of the paper and the discussion to which it gave rise.

He pointed out that in chemical works economy "power" and "heat" costs seem to be inseparable, but they vary in relation to one another in a marked degree. For example, in two different works, of each 100 tons of coal consumed, one will require 20 tons for motive power and 80 tons for heating, while the other will have these conditions reversed. The substitution of more ecomical engines for power purposes in the two works will have very different significance—as illustrated by a recent case in his own experience. A firm consulted him upon a proposal to pull out several small and wasteful engines and substitute two gas-engines with suction-gas plants. They had good boiler plant, but in bad condition and inefficiently worked. Though the engines were wasteful, the bulk of the steam generated seemed to be utilized for heating and boiling, and the boiler efficiency seemed to be low.

Simple tests confirmed these suspicions. The boiler efficiency was only about 50 per cent.; and only 20 per cent. of the steam generated went for motive power. Upon the basis of burning 100 tons of coal, 20 tons of this would go for power. The installation of the gas plant would reduce this amount (say) to 5 tons, or the whole consumption to 85 tons. The alternative suggested was to spend half the money the gas plants would have cost on boiler-house improvements, so as to bring its efficiency up to 70 per cent. Thus without any alteration within the works the 100 tons of coal would be reduced to about 72 tons. The first proposal, taking capital charges into account, showed 15 per cent. on its outlay involved, the second 50 per cent. on its outlay—obviously the better proposition from every point of view.

Later on, the author said: I lean strongly to the belief that the ordinary boiler furnace does not provide a satisfactory means of burning coal to advantage. The same chemical reactions are supposed to take place whether coal is burnt in a bed 9 inches deep on a boiler grate or 6 feet deep in a gas-producer. The volatile constituents are distilled off by the heat, and are consumed mixed with the secondary air admitted above the grate. The incandescent and coked fuel is penetrated by the air from below the grate, the oxygen of which is converted first to carbon dioxide then in a higher zone to monoxide, and this is, or should be, burned also with secondary air. With the gas producer the gas is generated and burnt under conditions closely approximating theoretical accuracy. In the boiler furnace (even in the best practice) a very large amount of excess air is used, which vitiates the results; while the maintenance of the correct conditions for combustion in a thin bed over an area of (say) 20 square feet is a matter of impossibility even with the most perfect mechanical stoking devices. In the boiler-furnace, however, the radiant heat of combustion is usefully employed; while in the producer it is generally dissipated. Numerous attempts have been made to adapt the principle of the gas-producer to boiler firing, with greater or less success. Mr. E. C. Mills is just now experimenting, with I believe considerable success, with a producer type of furnace attachable to boilers of the Lancashire and other types, in which the air for combustion is highly preheated through the agency of the radiant-heat of combustion.

Hitherto the firing of boilers by producer gas has only proved to be a paying proposition when bye-products could be extracted from the gas previous to its combustion, and even then only on a large scale. The all-round efficiency of the apparatus is necessarily low, while the ordinary recovery producer requires a large amount of steam to be associated with the air blast; and this is only generated at considerable expense. Professor W. A. Bone has, however, demonstrated that very high gas efficiencies can be obtained from boilers specially designed for gas-firing. His firm will guarantee 90 per cent., and his system is probably not the only one by which such efficiencies will be attained. In the near future we shall probably have recovery gas-producers capable of generating all the steam they need for blast from the heat in their outgoing gas. Then the use of the recovery gas-producer in conjunction with special boilers will enable the plant as a whole to work at approximately the same efficiency as the normal hand-fired boiler, and the resultant bye-products—sulphate of ammonia and tar—will be a handsome set-off against fuel costs, or may in certain cases even exceed them and show a profit. The recovery of bye-products from fuel used will become common practice in chemical works of any size. Several large chemical works in Lancashire and the Midlands already work on these lines; and the few figures in my possession indicating some actual results are confidential.

In modern producer recovery plant about 70 lbs. of ammonium sulphate are obtained per ton of coal gasified for each 1 per cent. of nitrogen in the coal, and about the same weight of tar; and as Lancashire slacks average about 1·3 per cent. of nitrogen, the gross return will be between 11s. and 12s. per ton of coal.

Producer gas provides a much more satisfactory means of transmitting heat through a straggling works than steam. The mains are probably less costly, and there are no losses corresponding with steam condensation; while for furnace work, high temperature drying, and evaporating, it offers great convenience and an all-round economy, which may be set down, from general experience, as equal to 30 per cent. over the direct burning of coal under such apparatus. Where steam is essential for process work it might often be better to generate it by gas firing at the point of utilization. In works spread over a large area, also, gas can be advantageously carried to isolated gas-engines, which, unlike small steam-engines, do not fall off in efficiency in the small sizes.

For purposes of comparison the following is an approximate table showing the performance and cost of modern prime-movers:—

(*a*) The most economical form of modern steam-engine (for example the "Uniflow") in conjunction with modern boiler plant.
(*b*) A steam-turbine of highest class with modern boiler plant.
(*c*) A gas-engine with "bituminous" gas plant.
(*d*) A Diesel oil-engine.

Type.	B.Th.U. per B.H.P. Hour.	Fuel Cost per B.H.P. Hour.	Capital Cost per B.H.P.
(*a*) Steam-engine	19,000	·102d.	£7
(*b*) Steam-turbine	21,000	·112d.	£6
(*c*) Gas-engine	15,000	·080d.	£8
(*d*) Diesel-engine	9,000	·180d.	£8

In the above 70 per cent. efficiency is assumed for boiler and gas plant. Coal of 12,000 B.Th.U. value at 12s. per ton. Diesel oil of 18,000 B.Th.U. value at 70s. per ton.

After giving the comparison figures in seven different instances —(1) 2000 H.P. of purchased electricity at ¾d. per unit; (2) a steam-turbine plant with water-tube boiler; (3) an ordinary Lancashire boiler fired by recovery producer gas; (4) the same, except that high-duty gas-fired boilers were installed and the producers were designed to generate their own steam;* (5) a 2000 H.P. recovery gas plant with gas-engines of 2000 B.H.P.; (6) a 2000 H.P. Diesel oil-engine; (7) peat gas recovery plant, Mond system, with 2000 H.P. of gas-engines—the author concludes his paper with the remark that, if heating processes are large in proportion to the motive power required, it is obviously greatly in favour of any of the gas-recovery schemes.

Replying to some remarks that were made in the discussion on the paper, Mr. Wollaston said: As to the smallest size plant that could be used for a recovery process, that depended on many points. There was no reason why the ordinary yield of sulphate of ammonia should not be obtained from a 100 H.P. gas plant, only the capital cost would be so high in proportion to the output that it would take away the profit. Working (say) ten hours a day, it had been proved that it was not worth while putting down a recovery plant to work with gas-engines under 2000 H.P.; but if they could get up to 100 per cent. load factor, for 24 hours a day, and work continuously, it could be done on a great deal less. He could not follow one speaker's argument as to throwing the gas away, and getting a higher return. It must be taken into account that 2000 H.P. for 7000 hours per annum was being produced for nothing, with a profit of 21 per cent. The Directors of the Power Gas Corporation, along with other people, had purchased a property in Natal, and had floated a company to gasify outcrop coal. Experts had asserted that the coal could be fed to the producer at 1s. 8d. a ton. It contained about 2·2 per cent. of nitrogen; and according to the estimates there would be a handsome profit. The gas was burnt to waste because it was valueless at present; but they hoped soon it would be possible to utilize it profitably. If coal or peat rich in nitrogen could be obtained at a low price, there was no doubt it was highly lucrative to put it through a

* This is the example Mr. Wollaston quotes in his letter, p. 401.

producer and recover the bye-products. In the case he mentioned, it was proposed that the producer should be put down right by the side of the peat field; and the price of 5s. a ton was the price for delivery at the producer.

PROFESSOR SABATIER ON CATALYSIS.

In the "JOURNAL" for the 30th of June (p. 1036), brief reference was made to a lecture on "Catalysis" delivered at King's College, London, by Professor Paul Sabatier. An excellent abstract of the lecture appears in the current number of the "Journal of the Society of Chemical Industry;" and from it the following extracts have been made.

DEFINITION.

Catalysis is the name given to certain chemical processes induced by the presence of substances which apparently take no part in the reactions. Thus, hydrogen peroxide in dilute solution decomposes only slowly into water and oxygen. When a little platinum black is dropped in, effervescence takes place, showing the rapidity of the decomposition induced by it. The platinum black can be recovered unchanged by filtration, and can be used again indefinitely to induce the same decomposition. The platinum black is called the "catalyst."

CATALYTIC REACTIONS.

Very many catalytic reactions are known, occurring in all branches of chemistry. Many reactions resemble catalytic ones in that the presence of substances which are apparently inactive serves either to accelerate or to retard the change. The reactions include decompositions, as with hydrogen peroxide; combinations —*e.g.* the union of hydrogen with oxygen, and the direct oxidation of sulphur dioxide induced by spongy platinum; and double decompositions, such as the formation of esters from alcohols and acids in contact with certain oxides.

THEORIES OF CATALYSIS.

Berzelius, who first called attention to the phenomenon of catalysis, offered no real explanation, but suggested that it was due to a change in the polarity of the atoms concerned. The importance of a fine state of division of the catalyst has suggested a physical explanation, long unchallenged. According to this theory, when platinum black is introduced into a mixture of oxygen and a combustible gas (hydrogen, alcohol vapour, &c.), the gases are absorbed rapidly by the porous material, which attracts them to its surface, and the gases thus absorbed are subject to increased pressure and a local rise of temperature, both of which conditions assist the chemical interaction of the gases. The products are immediately removed, and replaced by a fresh quantity of the original gases, and so the reaction continues. The heat set free by compression and by the combination of the gases accelerates the action, and the platinum may even become incandescent. The function of the catalyst is thus to produce local increase of pressure and temperature, so as to render possible—apparently at ordinary temperatures—a reaction which normally occurs only at higher temperatures.

Ostwald regards the catalyst simply as the accelerator of a possible reaction which would without the catalyst take place slowly, and sometimes so slowly as to be incapable of detection. This theory does not offer an explanation as to the attraction of certain gases and not others by the surface of the catalyst. Thus, platinum black must be supposed to attract hydrogen and oxygen, but not aqueous vapour. Further, certain catalytic actions are effected by platinum foil or wire, as well as by platinum black. A large sheet of platinum foil, slightly heated and held above an unlighted bunsen burner, causes combination of the gas and air; the foil becomes incandescent, and may start a flame. In these cases, the porous solid is not present.

Moreover, in the physical conception of catalysis, the important differences in the effects of various solid catalysts having the same structure and state of division are ignored. Zinc oxide and titanic oxide are physically similar, but act very differently on formic acid vapour at 300° C. With zinc oxide, equal volumes of carbon dioxide and hydrogen are formed; while with titanic oxide, water and carbon monoxide alone are produced. The physical explanation of catalysis is not applicable to liquid and gaseous catalysts which form a homogeneous mixture with the reacting substances. A rational theory of catalysis must be based upon the chemical action of the catalyst which can unite with some of the reacting substances so as to form an unstable intermediate compound.

INFLUENCE OF THE MASS OF THE CATALYST.

The catalyst thus appears to play an active part in the reactions which it determines. The temporary combination of the catalyst with one of the reacting substances makes the reaction possible, and a small amount of the catalyst can change a large quantity of the reacting substances, because the catalyst is regenerated by the rapid decomposition of the intermediate compound. There is thus no definite relation between the mass or the active surface area of the catalyst and the weight of the substances which it can produce. The reactions will, however, be more rapid as the quantity of catalyst is greater. Their velocity will be, in some degree at least, proportional to the mass of the catalyst in a homogeneous system, or to the surface in the case of solid catalysts which act only at their surface.

This chemical conception of catalysis has led the author, with his pupils, to the discovery of new facts, which may be grouped under two headings—*i.e.*, catalysis by metals and by oxides.

CATALYSIS BY METALS.

In a series of researches extending over nearly seventeen years, in collaboration with Senderens, Mailhe, Murat, and Espil, it has been shown that the common metals iron, copper, cobalt, and especially nickel, in a fine state of division such as is produced in the reduction of the oxides by hydrogen, carbon monoxide, or alcohol vapour, form very active catalysts in processes of adding or withdrawing hydrogen, and in molecular decomposition.

The catalytic action of finely-divided platinum had been used chiefly for effecting oxidation. Only in few cases had its power of effecting the addition of hydrogen been recognized. These were the conversion of nitric oxide into ammonia (Kuhlmann, 1838), the rapid combination of iodine with hydrogen (Corenwinder, 1852), the conversion of hydrocyanic acid into methylamine (Debus, 1862), and the production of ethane from acetylene (De Wilde, 1874). In 1897 the author discovered with Senderens that, in the presence of reduced nickel, free hydrogen at a very low temperature can rapidly change ethylene into ethane; and it has since been shown that this catalytic action of nickel is quite general, and is capable of effecting the addition of hydrogen not only in known reactions usually carried out by means of ordinary reducing agents (zinc and hydrochloric acid, sodium amalgam and water, concentrated hydriodic acid, &c.), but also in other reactions which could not be effected by the old methods.

The method employed for volatile substances is very simple. It is only necessary to pass them together with hydrogen in excess through a column of reduced nickel kept at a suitable temperature. In this way, nitro-compounds can be converted into amines—*e.g.*, nitrobenzene into aniline. Ethylenic and acetylenic compounds are readily converted into saturated compounds. Aliphatic aldehydes and ketones yield the corresponding alcohols; and amines are readily obtained from nitrites, oximes, and amides. Carbon monoxide and dioxide are converted into methane; and this may possibly be the basis of an important commercial process for manufacturing from water gas or coal gas a lighting gas rich in methane, and having a high calorific power.

In conjunction with his pupils, the author has shown the addition of hydrogen to aromatic compounds by means of nickel to be almost general; and this should form the starting-point for important synthetic manufacturing processes.

Hydrocarbons with multiple or complex nuclei, naphthalene, anthracene, phenanthrene, terpenes, &c., can be caused to combine with hydrogen by means of reduced nickel. Certain conditions are essential for the success of the process. The temperature must be kept within defined limits, which are wide in some cases, as with nitro- and ethylenic compounds, but narrow in others. The reduction of benzene cannot be effected above 250° C. The best temperature is usually about 180°C. The catalyst should be prepared in the reaction-tube itself, by reducing with hydrogen an oxide as free as possible from chloride and sulphate. The oxide obtained by calcining at dark red heat nickel nitrate prepared from commercial nickel and nitric acid is generally used. The nickel is more active the lower the temperature at which it is prepared, and the lighter the oxide from which it is formed. The metal obtained by reducing the green hydroxide below 300° C. is exceedingly active, and often causes molecular changes in compounds subjected to catalysis. Nickel reduced above 750° C. will not convert benzene into cyclohexane, but will change nitrobenzene into aniline. An essential condition is the conservation of the catalyst, the activity of which may be spoiled by impurities in the hydrogen or in the reacting substances. Chlorine, bromine, iodine, and sulphur are specially harmful in the case of nickel.

In conjunction with Espil, the author has recently shown that the humidity of the hydrogen has no unfavourable effect, and is favourable in certain cases. But while it is useless to dry the gas, it is necessary to purify it thoroughly. This may be done by passing it over copper turnings heated to dull redness and then over moist potash. It has been supposed that traces of chlorine, bromine, iodine, or sulphur would immediately render the nickel inactive; but this is not the case. Benzene containing 0·5 per cent. of iodine can be converted into cyclohexane, and during an experiment lasting for several hours, 150 c.c. of the solution was treated. On breaking the tube, the first half of the column of nickel was found to have taken up iodine and was inactive, and the second half was unaltered and was capable of continuing the reaction. Thus the destruction of the catalyzer by iodine took place slowly through successive layers; and in the actual experiment 250 c.c. of cyclohexane could have been obtained before the tube became inactive. A similar result was obtained with benzene containing 10 per cent. of carbon bisulphide. Reduced nickel effects the combination of hydrogen with numerous substances which need not necessarily be in the gaseous state.

The late Mr. John Brownless, formerly Chairman of the West Hartlepool Gas and Water Company, and at the time of his death, in the spring of the present year, at the age of 84, a Director of the Barnard Castle Gas Company, left estate of the gross value of £94,975.

PAPERS AND DISCUSSIONS AT THE IRISH ASSOCIATION MEETING.

RECENT WORKING EXPERIENCES OF "SELAS" INSTALLATIONS.

By C. B. Outon, of Inchicore, Dublin.

To the annual meeting of the Irish Association of Gas Managers, held in Belfast last year, I sent a short communication on the subject of "Selas" lighting; and it has been suggested that the subsequent experience would be of general interest to the members.

The principal installation has been erected at the Great Southern and Western Railway Company's Dublin terminus, in the Kingsbridge goods yard. This embraces an area of about 33 acres, and its maximum length is about half a mile. Since 1876 this has been lighted with gas manufactured at the locomotive and carriage works at Inchicore, situated some 2½ miles distant. The site of the gas-works being at a much higher level and the marked growth of the demand for gas in the railway works have both combined to reduce the available pressure in the goods yard. For many years the yard was lighted with flat-flame burners. Several attempts were made by way of improvement, by the introduction of low-pressure incandescent lighting; but these efforts were only partially successful, by reason of the defective pressure before referred to.

Various expedients were suggested to remedy the defects, such as the renewal and enlargement of the mains; but these proposals fell through on account of the cost. A supplementary gasholder at Kingsbridge was also under consideration; but the available ground area precluded this idea being successfully carried out. Accordingly, after careful deliberation, it was decided to adopt one of the excellent systems of high-pressure coal-gas lighting which are now on the market; and the "Selas" system was ultimately chosen. Incidentally, I may mention that this method differs materially from other forms of high-pressure lighting, which aim at the compression of gas only or of air only; the remaining ingredient being admitted by induction caused by the high velocity of the medium issuing at the lamp nipple. In the case of compressed gas only, an average of 5·1 volumes of air have to be induced in order to produce the perfect combustion and consequent higher temperature which have played such an important part in the modern success of high-pressure lighting.

The function of the "Selas" apparatus is to supply a mixture of gas and air of constant quality, and to deliver the mixture in quantity to suit the demand of any predetermined pressure. The system involves the initial compression of 2 volumes of air and 1 volume of gas; and this mixture is maintained constant throughout the entire main to the lamp nipples, where the balance of the air—viz., 3·1 volumes—is induced. It is this reduction in the quantity of induced air which enables the mixture to be compressed at a lower pressure of 10 inches, and the consequent reduced issuing velocity through a larger bore at the nipple, that distinguishes this method from other systems.

The construction of the "Selas" compressor is a little more elaborate as compared with those which aim at the compression of one of the ingredients only, inasmuch as provision has first to be made for reducing the pressure of the inlet gas to that of the atmosphere, and then passing it through a mixing gas and air valve, in order to ensure the proportion of 2 to 1 of air and gas being constantly maintained. It is very simple in its working and readily understood; and in the event of any accidental stoppage of the compressors, provision is automatically made whereby a stream of pure gas is admitted at ordinary main pressure—thus avoiding any panic or danger arising from total extinction of the light. At Kingsbridge, the compressors are in duplicate. They were originally intended to be motor-driven; but the prohibitive price per unit asked for the current for this particular purpose induced the Railway Company to adopt 3½ H.P. gas-engines partially loaded. The consumption of gas per hour has averaged 33 cubic feet, including the ignition burner. There is no night attendant. The only attention after starting at lighting-up time is to give an oiling to the bearings at 11 p.m. The employment of some good cylinder oil has obviated the necessity for any further supervision throughout the night.

By the adoption of the high-pressure system the old inlet main was found to be of ample proportions, and the old services have been utilized for the supplies to the bye-pass lights, one of which is provided in each lamp. It follows, therefore, that a new high-pressure service pipe had to be run. This starts as 4-inch, and afterwards steps down to 3-inch and 2-inch. These mains are of ample capacity, as when the initial pressure at the compressor starts at 10½ inches, the desired pressure of 10 inches is maintained at the farthest lamp, situated half-a-mile distant. The approximate length of high-pressure services is 2¼ miles.

The question of the height of lamps for exterior lighting received careful consideration; and it was decided to adopt a post which, together with the lamp and lamp cradle, gave a height for the light of 24 feet above the rail level. Thirty-two posts have been erected. Of these, twenty-two support lamps of 1500-candle power each, and the remaining ten lamps of 1000-candle power each; the latter being employed in the less important positions. Their average pitch is 160 feet. This distance affords a very uniform result for ground lighting, and entire absence of shadows. The lamps are constructed of enamelled steel, and are designed so that easy access is gained to the nipple for cleaning purposes whenever required. The bore of the nipple is made of fairly large diameter, which is required for the greater volume of mixture to pass at the 10-inch pressure. Hence it is not liable to be easily stopped by particles of dust; while carbonizing is unknown, on account of the bunsen mixture.

The mantle renewals have been carefully watched, with the following results:

Mantle Renewals per Burner per Month.

1914.	Jan.	Feb.	Mar.	April.	May.	June.
1500-candle power lamps.	2·2	2·3	2·2	2·0	2·0	2·0
1000-candle power lamps.	1·9	1·7	1·0	0·6	1 0	0·7

The total renewal of globes for the thirty-two lamps during the past half year has amounted to five only.

The transition from the older system of lighting to the present one has been received with unqualified praise from all concerned; and for its size and purpose the area is one of the best illuminated for goods yard work in the United Kingdom. The great improvement in lighting has reacted most beneficially on the expedition of all shunting operations, and there is also much less liability of personal injury to employees, and greater freedom from pillage. The running repairs to waggons incidental to fly-shunting have been materially diminished.

The goods store situated within the goods yard has recently undergone reconstruction, and now contains four roads and three loading platforms. This store is 285 feet in length and 135 feet in width. In its interior twenty-three lamps, each of 500-candle power, have been suspended at an average pitch of 40 feet. The effect of this illumination has materially assisted the expedition of the loading of goods. Ten other lamps of similar candle power are employed in lighting the exterior walls. There are also ten 200-candle power lamps used within the stores for minor purposes. A granary, 460 feet in length, and a goods platform have also been fitted with 200-candle power lamps.

The rate of mantle renewal in the 500-candle power lamps was as under:

Mantle Renewals per Burner per Month.

1914.	Jan.	Feb.	March.	April.	May.	June.
500-candle power .	0·5	0·43	0·4	0·4	0·4	0·4

The total candle power in yard, store, &c., amounts to 66,500. This is maintained by an hourly consumption of 1050 cubic feet of gas; each lamp having a guaranteed duty of 50 candles per cubic foot. This hourly consumption is less than that anticipated at 50-candle power per cubic foot, but is the actual result of experiment, and is doubtless due to the much higher quality of the gas—namely, 17-candles—made at the Inchicore works.

At the Inchicore works of the Great Southern and Western Railway Company, two new shops were opened in February last, and both are fitted up with the same system of lighting. These shops stand on an area of over 2½ acres, and are devoted to the construction and maintenance of the whole of the carriage and waggon rolling stock. In these shops the two compressors are motor driven from current generated from Diesel oil-engines. The principal unit here adopted is that of 500-candle power, as it is found more advantageous to use a larger number of distributed lights of smaller power among the machinery and between the roads. A total of 102 lamps of this particular candle power have been suspended at an average pitch of 33 feet; nine others of 1000-candle power each have also been supplied for larger spaces, and three more of 2250-candle power each have been suspended in the roof of one bay above an overhead electric crane of 60-feet span, which is used for lifting the bodies of the coaches. There is thus a total of 66,750-candle power between the two new shops. The lighting is all that can be desired, for it is now generally recognized that the nearer artificial lighting approaches the conditions of natural lighting, the greater the output and efficiency of the workshop.

The system has been deemed so satisfactory during the past winter's working that the Company's Locomotive Engineer (Mr. E. A. Watson) decided to extend its use to the large engine-shed now in course of reconstruction. This shed is 280 feet in length and 180 feet in width, and contains fourteen roads, which form provision for the stabling of engines and tenders. Here and in the adjoining lifting shop it is intended to instal about 150 lamps of 200 and 300 candle power. Owing to the all-night requirements and the cutting off of local current after 6 p.m., the "Selas" compressor will be driven by small gas-engines, which will be practically a duplicate of the goods yard arrangement.

When this work is completed, the gross total candle power developed by our various "Selas" installations will be 182,500.

DISCUSSION.

The President (Mr. P. J. Fitzpatrick, of Maryborough) said they had all listened with great pleasure to Mr. Outon's excellent paper, and he hoped there would be a good discussion upon it.

Mr. T. Hornby (Longford) remarked that he did not wish in any way to criticize the paper. Mr. Outon was one of their foremost men, and one of their best friends; and he always came forward with something well worth listening to. He had been

specially struck by the clear way in which the "Selas" system was explained. They often heard a lot about this thing or that thing, and the man who made or sold it would explain it to them; but after the explanation was over, they did not know where they were. Mr. Outon's explanation was not of this kind.

Mr. J. WHIMSTER (Armagh) remarked that, through Mr. Outon's kindness, he had had the pleasure of going over both the Inchicore and Kingsbridge installations; and to his mind they would compare very favourably with anything across the Channel. The members would never regret spending an evening in seeing them. The simplicity of the mechanism was such that he did not think any of them need be afraid, if they got the chance, to put down an installation on the "Selas" system. He only wished that he had an institution, or something of the kind, in connection with which he could find an opportunity of putting in an installation. Mention was made in the paper of freedom from shadows. Well, he walked across the goods yard with Mr. Outon; and if he had not seen the lamp-posts, he could almost have imagined it was sunlight. In connection with the various stores, and especially the granaries, where obstructions were to be found at every point, Mr. Outon must have spent an enormous amount of time settling the position of the lights.

Mr. J. PATERSON (Waterford) said he had not, like the previous speaker, yet been to see the installations referred to in the paper; but he would take the first opportunity of doing so. At present, he could not say he was altogether a convert to high-pressure lighting. The little experience he had had of it had not favourably impressed him. On the contrary, it had proved rather disappointing. He might say, in justice to the "Selas" people, that his experience had not been with their system. But, as he had remarked, his impression had not been very favourable—especially when they found makers of low-pressure gas lamps guaranteeing 50-candle power per cubic foot of gas consumed—the same, he understood, as was claimed for the "Selas" system. He noticed, however, that Mr. Outon had obtained over 63-candle power per cubic foot at Inchicore. This, he thought, was a better result than he had seen claimed elsewhere; and he would like to ask the author whether the candle powers mentioned had been actually ascertained, or whether they were based on the guaranteed power of the lamp. There were many lamps supplied of a stated candle power which, when put under test, were found to be very far short of what was claimed for them. He had recently visited the showrooms of a large English gas company, where he saw a great number of lamps. In conversation with the official whose duty it was to test the different lamps, he learned that some of the statements made by makers of lamps were very wide of the mark. From some sent in with a guarantee of 1000-candle power, it was impossible to get 300 candles. If it was a proved fact, by test, that they could obtain 63-candle power per cubic foot of gas, he would venture to suggest that there was a very bright future before the system.

Mr. OUTON, in replying to the discussion, said he was gratified at the manner in which the paper had been received. In reference to the 50-candle power, he had accepted the statement of the Company; and from inquiries he had made, he fully believed that this statement was well within the mark. The paper had been put together quite recently; and as he had been away, he had not had time to check everything in it. It might be necessary to have some slight revision of the figures. Should an error have crept in, he would make the requisite correction before the paper went to press.

Mr. PATERSON expressed the opinion that it was unwise to claim more than they actually got from any apparatus. He would rather under-estimate than put the value too high. The figure in the paper was, he thought, an error.

[Subsequently, Mr. Outon added to the paper the last sentence of the fourth paragraph from the end.—ED. J.G.L.]

EXPERIENCES IN AUSTRALIA.

By H. M'ELWEE, of Athy.

During my fourteen years' experience of gas-works in the Eastern and Western States of Australia, I found that the duties of a manager, especially on the smaller sized works, were much more difficult than on the home works; the climatic conditions of the country being not so favourable for the manufacture and distribution of gas.

The progress the country has made since the first days of its pioneers will give an idea of the go-ahead nature of its people. Gas-works have also shared in this prosperity, and gas men of the old and of the new blood have in no way been lacking in the pushing and erecting of gas-works. As an instance, a consulting engineer informed me a few years ago that he did not know where to procure a manager for one of the works he was erecting—not one could be found. [Very different from works in Ireland.] The majority of the managers have gone out under contract, although of recent years the voice of the people of Australia is "Australia for the Australians," in the making of important appointments, wherever possible.

The rate for labour is high—1s. per hour at least for unskilled labour, and a mechanic commands 12s. to 14s. per day of eight hours, and much higher in the Western States. Consequently, the cost of erecting works is very great, and more so in the interior, where it is difficult to procure labour.

But the erection of gas-works in the country is not very elaborate. A retort-house is quite often built of corrugated iron, and the whole of the buildings on the works are made of the same material. The manager's house will be of weather boarding, and corrugated sheet iron for the roof. This would be a very good house, and would cost about £300. These light buildings, which are mostly found in the country, are very suitable for the climate, as they cool down quickly when the sun is off them. The climate is usually very warm—approaching, in some places I have been engaged at, 110° in the shade and 20° or 30° above this in the sun. You have sometimes, in a warm summer, to cool with water the tools you are using, as otherwise you could not handle them; they being so hot from the sun's rays.

For domestic purposes, the rain water is caught from the roofs in circular tanks of about 1000 or 2000 gallons capacity; and in the dry seasons, which are unfortunately very frequent, the supply has to be used carefully, in order to pull through until the next rainfall, which may not be for about six months. Water to supply the works is obtained by sinking wells, and is elevated and stored in suitable tanks. In the larger towns, wherever possible, a water scheme is installed and the town reticulated.

As a town is built up, the erection of gas-works is going on; and this notwithstanding the price of gas, which is sold as high as 10s. per 1000 cubic feet. There is always the rival electricity in the field with gas; yet, though Australia has copied the latest and best from various other countries, gas seems to take on in a great many towns in preference to electricity. There are no chances lost, and gas-works are pushed to the utmost wherever there is an opportunity of a scheme of lighting being installed in a rising town, though coal has to be shipped a distance of 2000 or 3000 miles to some of the works that I was in. In another works the coal was brought a distance of 500 miles by rail. The railways being owned by the State, the freights are very low, and therefore a great help to industry. The coal situation is similar to that of the Old Country, with very frequent stoppages owing to strikes on trivial matters. The price at Newcastle (N.S.W.) is 7s. per ton for small and 11s. for large, with freight and charges added, which would bring the cost to the next State up to 13s. and 17s. Railway freight to the different towns varies from 2s. 6d. per ton upwards.

In the erection and extension of works in the country towns one is very much handicapped at times, and has not the same facilities as there would be in a city or in this country. It is usual in many places for a fitter or an erector to make his own spanners and many other tools, and he is left to his own resources to do it. The same applies to machinery which has been damaged badly in transit from the Old Country or from America; there is nothing for it but to put it together and make a job of it.

On one occasion I was sent to report on a works which had been erected a short time and was in operation. The holder (one only) was an old one, taken from another works, where it had been in use for a great number of years, and was fairly sound. But on re-erection the workmanship was bad. The majority of the rivets, in the crown especially, were loose, and leaking badly. There was nothing for it but to patch it under pressure. This was done by the application of a mixture of gold size and litharge. The street mains I found, on driving a bar down to each joint, were leaking. The under part of the sockets had lead projecting which had not been caulked home. The jointer, I was informed, was not a skilled tradesman, nor had he any experience. But he was the only man available, as is very often the case on country work. This man had the audacity to boast of the number of pipes he could put down in a day, which he was doing while the works were in course of erection. Needless to say, all the joints had to be gone over again. This often happens with many so-called quick jobs.

It is often very difficult to find skilled workmen, as work is plentiful in all the States, and, wages being high, Jack is always looked upon as being as good as his master, no matter how high the position of the master may be, or the lowly circumstances of Jack, even if Jack were (to use the correct phrase), "carrying the swag," which includes his bed and cooking utensils. There are no remarks passed on a man of this description, as he may be a wealthy man or a good mechanic; and if you asked him to sleep under a roof he would answer you by saying that he would catch a cold if he did so. Such is the living of a great number of Australian workmen.

On being appointed to take charge of a works and district in the suburbs of Melbourne, with a very large area of supply, taking in four districts, having gone into the arrangements of the works, I considered that my first duty would be to do a round of the mains and street lamps. In order to accomplish this, I was supplied with a fairly fast bronco, a number of which were kept on the works for lamp lighting and extinguishing purposes. I followed two lamplighters at a pace I did not bargain for, as my horse was fully determined to keep up with the other two. I being, as they term it, a stranger (a new chum), they gave me a right good shaking. The lamp lighting is usually carried out on horseback; the horses being so trained that all the men need do is to remain in the saddle, and they are taken to every lamp, stop, and away again, with a speed as if they were on a racecourse. The horses are also trained so as to allow the lamplighter to stand up on the saddle while he cleans the lamps and fixes the mantles on the

burners, a supply of which he always keeps in a bag attached to the saddle.

On some of the outlying districts I had Gunning's clockwork controllers installed, which, I believe, were about the first fixed in Australia—some eighteen years ago. They were wound up every eight days, and gave much satisfaction. This was a great relief to the horses and the men, whose spare time could be utilized on the works. Again, the controllers were a great saving on the mantles, which worked out at four per lamp per annum. Being an inland town, insects of all descriptions, and large blowflies, are very detrimental to the life of mantles.

The street lighting is kept up to a very high efficiency, and contracts with the local authorities are agreed to, in some towns, at £5 12s. per lamp per annum, for maintenance, lighting, and extinguishing; a fine of 1s. being imposed for any lamp not burning during prescribed hours (very bad weather to be taken into consideration, if this is the cause of the trouble). I have had incandescent burners fixed for the lighting of gold mine stampers for crushing the quartz—which is the severest test the mantles could undergo—and yet the lighting was a success; the burners being fixed on anti-vibrators of early type. There were four mines in the town so lighted; and though they had power and machinery galore, the mining company had no desire to instal electricity, but seemed satisfied with incandescent gas lighting.

On being appointed to another works, owing to the sudden death of the manager, I was asked to pack up with all possible haste, in order to catch the first mail boat, for a distance of about 2500 miles; my destination being the Western State. In a transfer of this distance household effects are not moved, as the manager's house is very often furnished; a small rent of £3 per year being paid for the use of same.

As to the management of works of this situation, you are completely left to your own resources, having neither shareholder nor director near you, as you are about eight days' steaming away from the head office. You may have to be your own retort-setter at times, as this class of workman is very scarce; and in the event of your not finding one, there is nothing for the manager but to do the retort-setter's work, or, at least, the principal part of it, at the same time paying due attention to manufacture. It is not an unusual thing for stokers to cave in. Here, again, the manager is obliged to come to the rescue, notwithstanding that his time could be fully occupied in the distribution department, and principally on extensions, which are continually going on. The high temperature, practically the whole year round, in which the manufacture of gas is carried on is very severe on retort-house men. The number of retorts where hand work is done is thirteen per man, drawn and charged in an eight-hours' shift, for which they are paid at the rate of about £3 15s. per week.

As to distribution, the cost of laying mains and services is very high in a number of towns in which I have been engaged, and the progress made very slow, as whole streets are met with, in places, of solid rock or sandstone up to the surface. Skilled workmen have to be employed for the cutting of trenches, if they should be deep, at about 12s. per day of eight hours. They are known by the name of "rock choppers." In the excavating of rock trenches rock picks are used, and a small gutter of about 4 inches broad cut the required depth and 4 feet in length. Then it is gaded, or shot out with the rackarock powder from the opposite side of the trench, and the chopping continued forward.

With the exception of shops, buildings are placed very far apart, and are self-contained, with plenty of spare ground between them, so that each house requires a separate service, and there is not often an opportunity of supplying two houses from one service, the distance being greater than from the main.

Holders are met with in places erected in tanks cut out of the solid rock to the bottom, without any lining or rendering whatever; but where there is an indication of leakage in the tank, a brick lining is built round it from the bottom to the surface.

The manager acts as secretary in many cases, and is responsible for all. This, I have no doubt, you would agree to, except in very large towns. The combination of manager and secretary might well be applied with advantage to Irish gas-works, as for half the secretary's salary the Irish manager would be only too happy to fill both positions. In small works the manager does most of the secretary's work.

In meter reading, the manager renders the account to the consumer at the time of reading, and has the accounts made up in book form, showing the index dial on top of the form, and marked for the consumer to compare with the meter. This system has a tendency to do away with disputes, as at a glance the consumer is able to see that the meter is correctly read. This is also essential when you have such a mixed number of nationalities to deal with, including Chinese, Japanese, Germans, Greeks, &c. You require to be very firm with these classes of consumers; and I have known very competent managers to fail on this one point only—the collection of accounts. A large number of accounts are paid on being presented, and outstanding accounts are charged in many places 10 to 15 per cent. if not paid within fifteen days from the date of rendering.

There is always a great demand for cookers; the climatic conditions being very favourable for cooking by gas. As domestics are nothing like equal to the demand for them, cookers are found to be of great assistance to the household. There is a light sheet-iron gas-oven and boiling burner combined, locally manufactured. This has a swing vertical circular burner inside, with a movable cap upon it, which has three openings equally divided round the side of its circle, by which you can have the flame altogether upright, or, by moving the cap, one part of the flame outside the oven, to act as a boiling ring, while the other two partitions heat the oven. A kettle or pot stand is attached to the side of the oven, just high enough to catch the flame from the burner which comes out from under the oven; and the whole is fixed on a table at any convenient height. This is found to be very economical in gas, and the price of the cooker is low compared with the imported one. Under a protectionist tariff the local article has the advantage in price, the sale of which is pushed everywhere possible.

It may also be interesting to give the increases in gas made in the last five years at a few of the works of one company only, the Colonial Gas Association, who own sixteen works:—

Albany, an increase from	4	millions to	5½	millions.
Bairnsdale	,,	3½	,,	5	,,
Boxhill	,,	11⅜	,,	32½	,,
Mount Gambier	,,	3⅜	,,	8¾	,,
Sandgate	,,	3¼	,,	10	,,
Wangaratta	,,	4½	,,	6	,,
Cairns	,,	5½	,,	12½	,,
Casino (new works)		—		6	,,
Katoomba (new works)		—		20	,,

The manager's wife co-operates to a great extent on many of the works; and her experience and knowledge are of great assistance to all concerned. As the manager and his assistant, and even stokers, are often engaged on extensions and services—the stoking being done at intervals of six to eight hours—the lady is left in charge. Where this is customary, outsiders take no notice of it; and it is always advisable, and generally the rule in the Australian climate, that ladies as well as workmen are continually moving around, as they feel much better for it, especially in the summer time, when temperatures are high.

There is a good field for machinery in Australian gas-works. Although a great number of works are run without exhausters, even up to a make of 10 million cubic feet, the carbonizing results are high, up to 11,000 and 12,000 cubic feet per ton being produced. The Australian coal or shale is of an excellent quality for gas producing, and is very plentiful, with the exception of Western Australia, where it is of inferior quality, and is useless for making gas.

Australian timber is also used in many works for gas making; this being very serviceable where there is no exhauster, as it gives a fair yield (about 8000 cubic feet per ton) and reduces the quality of the gas, which otherwise would be too high for incandescent burners of the older type. Timber is to be found in great abundance throughout the country. Red gum yields the best results; and this can be procured at about one-third of the cost of coal.

The workmen of the carbonizing department in large works have had an oppressive time of it, and, in my estimation, the working of inclines is more severe on the men in Australia than horizontals. Vertical installations which are now taking on will be a great relief. If ever machinery was required, and the stoker's work made easier and cooler, it is in an Australia retort-house, where the working conditions are very trying, and require men of superior strength and ability to carry on the work. I can safely say that the Australian native and early importations of workmen, the majority of whom are from our own Green Isle, are of a very tough and wiry nature. As a famous reverend lecturer, recently in Dublin, after his travels around the globe, and meeting all peoples, declared, they were all of the same human nature.

DISCUSSION.

Mr. J. PATERSON (Waterford) said they must all have been interested in the experiences recorded by the author, whose first effort was a good one. The paper, however, did not much lend itself to discussion. In one part, mention was made of the cost of the conveyance of coal. Mr. M'Elwee said no chances were lost, and gas-works were pushed to the utmost wherever there was an opportunity of a scheme of lighting being installed in a rising town, though coal had to be shipped a distance of 2000 or 3000 miles in the case of some works. For another works, he added, the coal was brought a distance of 500 miles by rail; and the railways being owned by the State, the freights were very low, and therefore a great help to industry. Was this a plea for the ownership of the railways by the State at home? If they did belong to the State, and the State carried coals for nothing for one business, it must be at the expense of every other company or industry; and he did not see why the State should bolster-up one industry at the expense of another. Let each stand on its own legs. It was, of course, a debatable question; but it was worthy of attention.

Mr. M'ELWEE remarked that his answer to this was that, with the State ownership of railways, the dividends would go to the people, and not to companies. The people under State ownership had the benefit of any reduced freight. He did not think he would say anything further on this point.

The Australian Meeting of the British Association.—Readers may remember that arrangements were made for holding this year's meeting of the British Association in Australia during the present month. The main party were to leave London on the 3rd ult. by direct steamer *vid* Suez. Information has been received in London from the officers of the Association in Australia to the effect that the oversea party arrived there safely, and that the meeting was being proceeded with in accordance with the original programme.

EDUCATION AND CERTIFICATION OF GAS-FITTERS.

Under date of the 10th inst., Mr. W. T. DUNN, the Secretary of the Institution of Gas Engineers, has issued the following circular letter:—

The Council desire me to draw your attention to the fact that the Department of Technology of the City and Guilds of London Institute have now added to their programme of examinations the subject of "Gas-Fitting" as a separate and distinct branch of technical education—this previously having been included in the syllabus for "Plumber's Work."

The course in the technology of gas-fitters' work includes instruction in the properties of gas, regulations affecting gas supply, and the practice of all gas-fitting work, illustrated by models and actual exercises in the gas-fitters' shop. The course is intended to cover at least three years; and there will be three examinations, one of which may be taken at the end of each year's instruction.

The examination in Grade I. will be on the elements of gas-fitters' work, and the principles governing gas supply. The examination in Grade II. and the final examination will each consist of two parts—a practical test of workmanship and a written examination in the theory and principles of the subject.

A copy of the syllabus is enclosed. [This was given in the "JOURNAL" last week, p. 350.]

Assuming that sufficient support can be obtained in your district and the surrounding townships, the Council feel sure that the Technical Colleges there, in connection with the City and Guilds of London Institute, will be prepared to arrange for the formation of classes in gas-fitting.

As you are aware, the use of gas is still advancing—the increase in the country's total output during the past five years being 15½ per cent.; and there seems every prospect of its greater employment in the future. Gas is now consumed for many purposes and in many ways unthought of a few years back, through the introduction of new methods of heating, lighting, ventilation, and power, as instanced by low and high pressure high-power lamps, modern types of fires and hot-water circulators, improved gas-engines, and the many gas appliances used in industrial processes.

In view of these facts, the suggested classes will be of considerable service to gas-fitters—especially to the juniors; and having studied and passed examinations in the subject will tend to improve their status generally, and at the same time will be a guarantee to employers that their men have given thought and attention to their work.

The Council hope you will encourage the formation of, and give the necessary support to, any classes that it may be found possible to organize at the Technical Colleges in your neighbourhood.

Mr. Dunn enclosed a report of the Conference on the subject, which was held in Liverpool during the recent meeting of the Institution, and which was referred to in the "JOURNAL" for June 23, p. 878.

SOCIETY OF BRITISH GAS INDUSTRIES AND THE INSTITUTE EXAMINATION PRIZES.

The Secretary of the Society (Mr. Arthur L. Griffith) sends a list—confirmed by Sir Philip Magnus—of the winners of the prizes presented by the Society upon the results of the City and Guilds of London Institute examinations in "Gas Engineering" and "Gas Supply." The awards were as follows:—

GAS ENGINEERING—FINAL EXAMINATION.

First Prize, Three Guineas.

TOM RUDGE, Foundry House, Stafford. Examination Centre, Birmingham Municipal Technical School.

Second Prize, Two Guineas.

JOHN WILLIAM JONES, Station Road, Hadfield, near Manchester. Examination Centre, Manchester School of Technology.

GAS SUPPLY—FINAL EXAMINATION.

First Prize, Three Guineas.

TOM RUDGE (as above).

Second Prize, Two Guineas.

JAMES LAWRENCE PAGE, 35, Mexfield Road, East Putney, S.W. Examination Centre, Battersea Polytechnic.

The "Intermittent" Vertical Retorts.—The Vertical Gas-Retort Syndicate, of 17, Victoria Street, S.W., in order to remove any misapprehension that may exist, call special attention to the fact that the "intermittent" vertical retorts, as erected by them, are built in accordance with British letters patent, entirely by British contractors and labour, and with British material.

North British Association of Gas Managers.—The Hon. Secretary of the Association (Mr. Peter B. Watson, of Wishaw) states that, at a Committee meeting last Friday, it was decided that the annual meeting, instead of being held as originally arranged in Perth, should take place in Glasgow on Sept. 3, at the Institute of Engineers and Shipbuilders. The proceedings will be limited to one day only, as there is to be no excursion.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Shortage of Incandescent Mantle Materials.

SIR,—I learn from very good authority that there is a shortage of thorium nitrate in this country; and I suggest that corporation gas departments and companies collect as much of the gas-mantle ash as possible from private consumers and from the street-lighting departments. I believe that at the present time a good price is paid for mantle-ash; and it would be helpful to the firms making mantles to be able to buy the ash.

I feel sure that it would be advantageous to the gas industry if you would write a short article on this matter.

JOHN BOND.

Gas-Works, Southport, Aug. 14, 1914.

SIR,—I would like to suggest to gas lighting engineers throughout the country that it would be in their interests in this time of crisis, if they will save their mantle-rings, mantle-boxes, and mantle-ash. The two former, because it is going to be exceptionally difficult to get supplies of these; the latter because it will stand in good stead when handed to a chemical manufacturer, for recovering thorium.

CHAS. R. G. BOWDEN, Manager.
(Voelker Lighting Corporation, Limited.)

Garratt Lane, Wandsworth, Aug. 14, 1914.

[Our esteemed correspondents' suggestions have been carried out, as will be seen on reference to p, 375 of this issue.—ED. J.G.L.]

Sulphate Shipped Abroad.

SIR,—I enclose a copy of a letter which I am sending out to the members of this Association with regard to payments for sulphate shipped abroad. Perhaps you would be good enough to insert it in your next issue.

D. MILNE WATSON.
Chairman of the Sulphate of Ammonia Association.

84-86, *Horseferry Road, Westminster, S.W., Aug.* 15, 1914.

[ENCLOSURE.]

Sulphate of Ammonia Association.

84-86, Horseferry Road,
Westminster, Aug. 17, 1914.

Dear Sirs,—As Chairman of the Association, I have been asked to inform all our members that, owing to the present state of war, there is a complete disorganization of financial relations between this and other countries. As a result, no payments are being received for sulphate already shipped abroad, and bankers are refusing to make payments even against letters of credit for sulphate that might be shipped now. This means that for a time at least few shipments can be made. Steps are being taken to ventilate this state of things in the proper quarter; it is hoped with success.

Yours faithfully,
(Signed) D. MILNE WATSON,
Chairman of the Association.

Supplies of Gas Oil.

SIR,—In the current issue of the "JOURNAL" you make the following statement:—

> "The Standard Oil Company announce that they have stopped all exports of petroleum and other oil products destined for Europe."

There is no truth in this report; and you will find, on reference to the Press, that it was categorically denied on behalf of that Company.

Shipments of oil products, including oil for gas-making, are coming forward as quickly as steamers can be found and the necessary arrangements made.

Thanking you for correcting a report which may cause undue concern to many of your readers.

JAMES HAMILTON,
Director.

Anglo-American Oil Company, Limited,
Queen Anne's Gate, S.W., Aug. 14, 1914.

Power Generation at Collieries.

SIR,—I have been unable to read your valued "JOURNAL" during the last few weeks, and, therefore, have only just seen Mr. Huessener's letter appearing in the issue of July 7. I think I am justified in requesting permission to add thereto.

On March 31 last I read a paper before the Manchester Section of the Society of Chemical Industry, on "Power and Heat Costs in Chemical Works." I included therein a number of hypothetical examples of the cost of generating power by steam and internal combustion engines. I enclose a reprint.

Mr. John Davidson saw a copy of this paper, and, with my sanction, reproduced some of these examples in his paper, on the "Internal Combustion Engine for Power Generation at Collieries," with insignificant alterations.

Now it is fairly widely known that Mr. Davidson's figures were substantially mine; but I did not realize, until reading Mr. Huessener's letter, that they might saddle upon me views which I do not hold. On the contrary, I go a long way with Mr. Huessener—believing that in colliery and other practice the combination of the steam-engine or turbine and (recovery) gas-fired boiler offer possibilities of economy and convenience which are not possessed by any other power plant combination. I clearly stated this in my paper named above, and gave an example of what I believe to be possible—obtaining a result

somewhat superior to Mr. Huessener's calculation. This was due to my assuming a gas plant efficiency of 70 per cent. (which will I believe very soon be possible), and a boiler efficiency of 90 per cent. (which the Bonecourt Company will guarantee).

My figures – Example 4 in the paper—were:

Example 4.—Plant as in Example 3, except that high duty gas-fired boilers would be installed, and producers designed to generate their own steam, assuming these to be practicable.

Capital Costs.

2000 H.P. of steam-turbines at £4	£8,000
Bonecourt or like boilers (say)	4,000
40 tons special gas recovery plant (say)	10,800
Foundations, buildings, and chimney	3,420
	£26,220

Running Costs.

Dr. 12,000 tons of coal at 12s.		£7,200
480 tons of acid at 30s.		720
Oil and stores		750
Rags and packing sulphate		160
Labour, 22 men at £70.		1,540
Maintenance at 2 per cent.		524
Interest and depreciation at 10 per cent.		2,622
		£13,516
Cr. 480 tons of sulphate at £12 10s.	£6000	
480 tons of tar at 20s.	480	
		6,480
Net running cost per annum		£7,036
Cost per H.P.-hour		0·120d.
Cost per H.P.-year		£3 10s. 2d.
Equivalent cost per unit switchboard		0·179d.

I quite agree with Mr. Huessener that the 100 per cent. load-factor is seldom if ever attained; and I clearly stated this fact in my paper named above—indicating generally how lower load-factors would affect the result.

T. ROLAND WOLLASTON.

26, *Corporation Street, Manchester,*
Aug. 12, 1914.

The Irate Mr. Purse and the Carlisle Electricity Deficiency.

SIR,—My attention has been drawn to a paragraph in your issue of the 11th inst. regarding this undertaking which I do not know whether to regard as funny or serious. If you intend to compete with "Comic Cuts," then I think you should reduce the price of the "JOURNAL" to its proper value. If you intend to be serious, you might drop the German tactics of censoring the whole of the facts.

I was not responsible for, or boasted of, the profit you mention of £1510. As regards the other reasons for the deficiency, you will find these set out in detail in my annual report, of which I enclose a copy.

As regards the question of the 0·5d. to which you sneeringly refer, I would say that our supplies in this direction not having been extensively pushed, they have had no effect materially one way or another on the profits.

While you refer to the Carlisle electricity undertaking, you omit to note that the Carlisle gas undertaking showed a decrease in profit from £8608 to £3589 for the past year. You also omit to mention the fact that the Bradford gas undertaking had a loss last year of over £800, compared with a profit of £19,000 the previous year; and, furthermore, that both the Glasgow and Stockport gas undertakings showed very heavy decreases in the profits. It is quite evident the Carlisle electricity undertaking has not much to learn from this.

FREDK. W. PURSE,
City Electrical Engineer.

Carlisle, Aug, 15, 1914.

[It was manifestly a most unkind action on the part of the person who called Mr. Purse's attention to the paragraph in last week's "Electricity Supply Memoranda;" for it has made him unduly excited, and has caused him to write in a manner that he would probably not adopt in calmer moments. We have no intention to compete with "Comic Cuts;" we are quite satisfied to leave that particular form of competition to the (in that direction) more skilful persons who contribute to the columns of certain of our electrical contemporaries. But as to the "German tactics of censoring the whole of the facts," whatever facts were censored was the work of electrical contemporaries, so that the blame for any suppression must rest not upon us, but upon them. Talking of "censoring the facts," people who live in "glass houses should not throw stones." "Censoring facts" is a practice that has been largely followed by the electrical press and many electrical engineers for many years past. It is to be regretted that Mr. Purse cannot claim the honour of the profit that was made in 1912-13; and that the first year of his management, partly through uncontrollable adverse circumstances, and partly through a controllable one, should have ended in a deficit. Our main point in the irritating paragraph was that evidently the charges at Carlisle for electricity did not allow sufficient income to secure a margin when costs from any circumstance increased. We mentioned the increase in the cost of coal (partly due to enlarged output), and the increase in the capital expenditure. Therefore we did not hide much; and we could not state any point about which information was not vouchsafed in the electrical papers. It now seems that out of 608,912 additional units sold, only 10,000 extra were sold to private consumers and 35,000 extra to the tramways. But the increased income from these two sources was respectively only £16 and £12, owing to reductions in price. The reductions do not commend themselves as highly politic ones, in view of the known position of the fuel market. On the other hand, the balance of the increased output—563,912 units—was apparently sold for power purposes, and gained an additional income of £1800. The result is that the administration at Carlisle secured an increase of only 11 per cent. of income from 25 per cent. increase in output, and the average price shrunk from 1·8d. to 1·62d. The reduction of 0·18d., multiplied by 3,140,457 units, would have made a considerable difference to the financial results in Mr. Purse's first year of office. We see that the increase in heating and cooking supplies shows the "gratifying rise" from £37 to £220! If Mr. Purse will restrain his impetuosity a little before writing again (if he desires to do so), and just consult the files of the "JOURNAL," he will find that we have not omitted to give prominence to the results of the gas undertakings to which he refers, which results were due not to any lack of progress in the gas business, but to the price of coal and the unexpected (this is singular during the times of high coal prices) falling off in the market values of residuals. At Carlisle, there was also a reduction of 3d. in the price of gas to ordinary consumers and 6d. to prepayment consumers. We are really very sorry that Mr. Purse feels so injured and angered.—ED J.G.L.]

REGISTER OF PATENTS.

Purifying Illuminating and Heating Gases and Obtaining Useful Products.

"ATHION" G.M.B.H., of Mannheim-Waldhof, Germany.

No. 17,877; Aug. 5, 1913. Convention date, Aug. 7, 1912.

According to this invention, the practically complete removal of carbonic acid from illuminating gas is first effected by bringing the gas, which has been freed from ammonia and hydrogen sulphide, into intimate contact with a solution of alkali carbonate—for instance, potassium carbonate lye—in any suitable absorption apparatus at not too high a temperature. The carbonic acid is thus absorbed from the gas and bicarbonate of the alkali is formed. The carbonic acid absorbed is then expelled from the alkali carbonate lye by heating the lye in suitable apparatus; while the remaining lye can be used again for the absorption of carbonic acid from further quantities of gas.

The carbonic acid obtained in this way can be used for any purpose required—for example, it may be liquefied, after previous purification, for use as liquid carbonic acid, or it can be supplied, in an unpurified state, to retorts or gas-generators, for the purpose of producing carbon monoxide.

In this way, the patentees remark, gas-works can, in the summer (when there is a reduced demand for gas and a large consumption of refrigerating agents), bring the carbonic acid obtained into the liquefied condition for use as a refrigerating agent, and, in winter (when large quantities of gas are required), such works can with advantage convert the carbonic acid into carbon monoxide.

The mere fact that carbonic acid can be absorbed by solutions of alkali carbonate has, of course, long been known, they point out; and they do not make any general claim to the removal of carbonic acid from gases by the absorption of carbonic acid by means of alkali carbonates; but the invention applies this reaction to a branch of industry to which it has not heretofore been applied—namely, to purifying ordinary illuminating gas obtained from the dry distillation of coal and to the utilization of the carbonic acid so obtained.

Cocks or Valves for Gas-Burners.

FLETCHER, RUSSELL, AND CO., LIMITED, and FLETCHER, T. W., of Warrington.

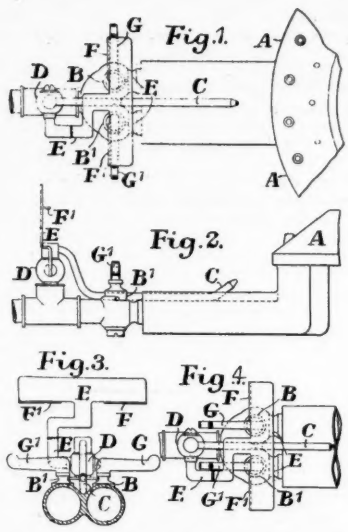
No. 705; Jan. 10, 1914.

This invention has special reference to the plugs of pilot and main cocks, which are interlocked with each other in such a manner that the turning on of the pilot cock is ensured by, or must precede, the turning on of the main cock; and the invention comprises means for ensuring the turning on of the gas to the pilot light before turning on the gas supply to the main burner, and the re-lighting of the pilot light on the turning off of the gas from the main burner.

Fig. 1 (p. 403) is a plan of the cocks of a burner having two sets of nozzles controlled by separate cocks—the cocks and the cock of the pilot light being closed. Fig. 2 is an elevation of fig. 1 with the cock of the pilot light turned on; and fig. 3 is an elevation at right angles to fig. 2. Fig. 4 is a plan of the burner cocks turned on and the pilot cock turned off.

A is part of a gas burner having two sets of jets or nozzles; B B^1 are cocks for regulating the supply of gas to the sets of jets or nozzles; C is a pilot jet or nozzle; and D is the cock for controlling the gas to it. The handle E of the pilot cock is provided with stops F F^1, which, when the pilot cock and the supply cocks are closed, engage the handles G G^1 of the cocks B B^1 (as shown in fig. 1), and prevent the latter being turned on until the handle E has been operated to turn on the pilot cock (as shown in figs. 2 and 3). The pilot light is, of course, lit before the cocks B B^1 are turned on, and it lights the burner jets in the usual way.

If, when the cocks B B^1 are turned on and the jets of the burner are burning, the handle E of the pilot cock is operated to extinguish the pilot light, the stops F F^1 again engage the handles G G^1 of the cocks B B^1 (as shown in fig. 4), and the latter cocks cannot be turned off to extinguish the burner until the handle E has been operated to again turn on the gas to the pilot light, which is lit at the burner. If, however, when the burner is lighted, the pilot light is extinguished, the burner cannot be turned off until the pilot light has been turned



Fletcher, Russell, and Co.'s Interlocking Burner Taps.

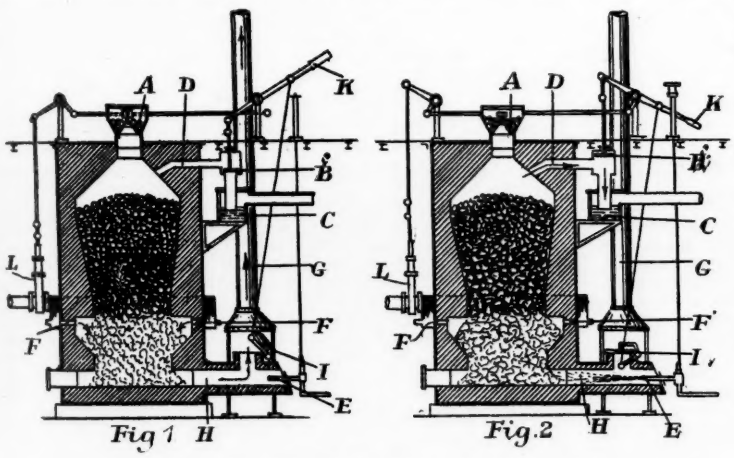
on and lit; and if, when the burner is extinguished the pilot light is also turned off, the gas to the former cannot be turned on until the pilot light has first been turned on.

Water-Gas Production.

DELLWIK-FLEISCHER WASSERGAS, G.M B H., of Frankfort-on-Main.

No. 304; Jan. 5, 1914. Convention date, Aug. 6, 1913.

This invention is based upon the fact that, in order to produce water gas from bituminous fuels (and therefore not from coke, anthracite, charcoal, and the like), it is desirable and even necessary—in contrast to previous processes—in order to obtain a good gasification of the fuel, that the gases produced in the coked layer of fuel by the introduction of steam shall enter the upper layer of fuel as hot as possible. It is impossible, however, to obtain this condition, the patentees remark, if, as hitherto, the air is introduced during the hot-blast period at the lower end of the fuel column through the grate, because in such a case the hottest point is right at the bottom immediately above the grate; so that in the period of liberation of gas the gases from the bottom coked layer enter the coal layer in an already partly cooled state, owing to their passage through the upper cooler portion of the coked layer, and can only bring about incomplete production of gas. Also, if, as hitherto proposed, the air is injected successively at different points lower and lower in the column of fuel, the tendency is for the whole column of fuel to take up the same temperature. This temperature is, however, lower than that obtained if all the air is blown in at one place; and consequently the gas passing into the upper uncoked fuel is also at a lower temperature. The process is, therefore, to this extent less efficient.



An Improved Dellwik-Fleischer Water-Gas Generator.

In the process according to the present invention, the patentees start with the principle that the hottest part of the combustion column should, theoretically, lie at the border line between the layer of coke and the layer of coal. For this reason, the requisite air for combustion is blown in during the hot-blast period not at the bottom or top, but approximately at the boundary between the fuel already coked and the coal still present; and the products of combustion are drawn off at the lower end of the fuel column. In the period of liberation of gas which follows, steam is forced through the entire column of fuel. By this procedure, it is ensured that during the hot-blast period the hottest zone is no longer formed at the bottom or at the upper end of the column of fuel, but quite close to the boundary between the fuel already coked and the coal still present. The steam blown in during the blast period at the lower end of the fuel column then produces water gas in the fuel already coked. This gas reaches its maximum temperature at the dividing zone and passes at this maximum temperature directly into the coal to be coked. By this means, the most favourable action of liberation of gas and distillation thus takes place in this uncoked part of the column of fuel. This advantage is said to be the greater inasmuch as this uncoked part of the column of fuel has not up to this point been deprived of its valuable components—such as tar, ammonia, benzol, and so forth—by the passage of the products of combustion. Further, the fact may be incidentally pointed out that the steam, before passing through the column of fuel, is first passed through parts of the producer (the lower part of the producer and the horizontal part of the flue) through which immediately previously the hot products of combustion were led away, and that also the steam does not immediately on its entrance into the generator impinge upon the hottest zone.

Fig. 1 shows the position of the parts of the producer during the hot-blast period. Fig. 2 shows them during the period of liberation of gas.

The producer at its upper end (in the vicinity of the feed hopper A), is provided with a gas passage D passing through the valve B over the receiver C. Further, at the lower end of the combustion column the producer has a steam duct E, which is positively connected with the valve B for opening the gas outlet pipe D. The ducts F, for introducing the hot-blast air, are not at the lower end of the producer, but just above the zone composed essentially of coke and generating the water gas, and, further, the flue G, for discharging the combustion products during the hot-blast period, is connected by a flue H with the lower part of the producer. The supply valve L to the ducts F is positively connected with the valve B, with the steam valve E, and with the damper I of the flue.

The operation of the apparatus is as follows: After the air supply valve L to the ducts F and the damper I, shutting off the flue G, have been opened, the hot-blast air flows from above downwards through the lower part of the fuel column and passes, together with the products of combustion, into the flue. When the necessary temperature has been reached, the valves are again reversed by the handle K; and, consequently, the ducts F and the damper I are closed and the valve B and the steam-valve E are opened, as shown in fig. 2. Now, in counter-current to the hot-blast air, the steam from below flows upwards through the column of fuel, and reaches first the colder layers of fuel, and only comes into the hottest zone when it passes higher up and then flows through the column of coal into the gas delivery flue D, over the receiver C, to the outside. In the column of fuel above the layer of coke, effective distillation thus takes place; so that not only water gas rich in methane, but also bye-products (tar, ammonia, benzol, and so forth), can be recovered.

Coin-Controlled Gas-Meters.

WRIGHT, A. C., of Witton, and KING, F. H. W., of New Oscott, near Birmingham.

No. 10,656; April 30, 1914.

This invention, relating to coin-controlled gas-meters, has for its object to provide mechanism for transmitting motion through the medium of the inserted coin to the meter-valve, and for facilitating the adjusting of the mechanism to suit different prices of gas; the mechanism being of the type in which are employed a pair of concentrically arranged slotted spindles adapted to be connected by a coin and to serve jointly as a coin-carrier; one of the spindles being attached to an external finger piece and the other connected through gear wheels to the usual screw-actuated gas-valve.

The engraving next page shows a side elevation of the coin-actuated mechanism, an end elevation (taken internally) showing the part of the mechanism associated with the external finger piece, and a part sectional end elevation (taken internally) of the mechanism associated with the gas-valve.

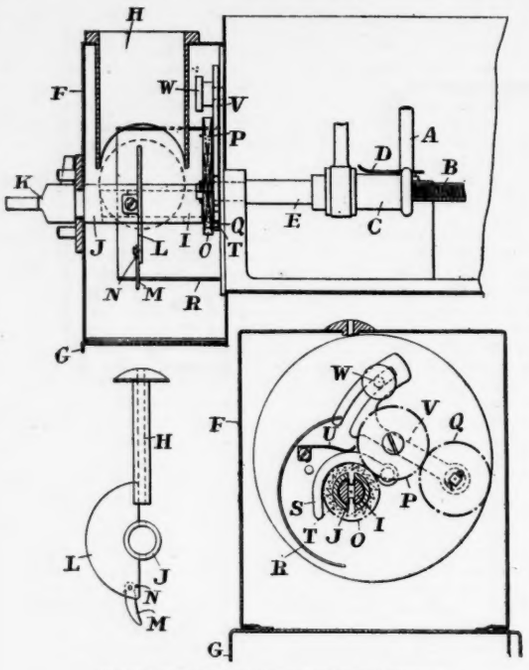
Adjacent to the ordinary gas-valve stem A is mounted the usual screwed stem B and sliding sleeve C, from which latter the valve stem is actuated through an ordinary lever D. Rotation is imparted from the coin to the shaft E by mechanism to be described. Within a detachable case F, mounted above the ordinary cash-box G, is a fixed vertical coin-guide H, beneath which is mounted a coin-carrying spindle, consisting of two concentrically arranged parts I J. The latter consists of a sleeve adapted to fit over the former and fitted at its outer end with a finger-piece K.

The part J has mounted on it a guard piece L, of semi-circular shape; and at one end of it is hinged a detent M, which (in the position shown) hangs in an approximately vertical position. If the part J is half revolved, thereby bringing the detent into the upper position, it lies approximately horizontally across the lower end of the coin-shoot H—being supported in this position by its abutment against pegs N on the guard.

The function of the part M is to prevent the insertion of a coin into the coin-carrier except when the latter is in the proper position. Both parts I and J are slotted diametrically for the reception of a coin; the slots being of such dimensions that the coin cannot fall through them but rests therein. The slot in the part J occupies an intermediate position between the ends; but the slot in the part I extends to one end of that part. By means of the inserted coin the parts I J are locked together, so that motion imparted to the finger piece K is transmitted to the part I and thence, through gear wheels O, P, Q, to the shaft E. After the coin-carrier spindle has been rotated through half-a-revolution the coin falls from it by gravity into the cash-box. During the transition of the coin from the position of entry to the position of discharge, it is prevented from falling out of the coin-carrier by an ordinary guard R; and during the return motion of the part I the part J is prevented from rotation by the engagement of a pawl S with a ratchet wheel T under the action of a spring U.

The wheel O is arranged to freely slide upon the spindle I, and is

formed with internal key-pieces which enter the slot in the part I and effect a positive connection between it and the wheel. By the provision of the internal projections in the wheel O and the utilization of the coin slot in the part I, a convenient device for detachably connecting the wheel to the spindle part is obtained. To change the



Wright and King's Coin-Controlled Meter.

wheel it is simply necessary to slide it off the part I after the case F and part J have been withdrawn. The necessary adjustment of the wheel P to suit the different wheels O is obtained by mounting on an ordinary arm V swung co-axially with the shaft E and secured by a screw W, which passes through a slot in the arm.

Gas Cooking-Stoves.

South Metropolitan Gas Company and Chandler, D.

No. 8476; April 3, 1914.

This invention has reference to gas-cookers for domestic purposes suitable for small cooking operations; and concerning it the patentees say: In the cooker which forms the subject of the present application there are associated together in a novel manner a number of elements, the novelty of which is not individually claimed; the invention being to obtain the maximum of efficiency and to facilitate greatly the cleaning of all the parts of the cooker. Accordingly the cooker comprises the usual stove provided with a top or hot plate detachably hinged thereto. The burner is a tube of hoop or ring form, with holes for projecting the flames inwardly below the deflector in a horizontal direction. This burner rests in notches in the upper edge of the stove uncovered when the top is lifted, and is reversible end for end to suit the position of the gas supply pipe. The burner forms a support for the deflector or grid, which can be lifted out by means of a handle when the cooker is required for boiling. The mixing-tube of the burner forms a handle for removing the burner with the deflector resting thereon if desired.

Fig. 1 is a front view, fig. 2 a plan, fig. 3 an end view, fig. 4 a plan of the burner and grid detached, and fig. 5 is a side view.

A is the box of the cooker. B is the top, hinged to the box in such a way that it can be entirely detached—preferably by a sliding movement endways of the box, so as to withdraw the hinge pins from the eyes in which they fit. C is the burner, which is a tube shaped to fit the interior of the box A, wherein it is supported by means of a lug on one side and the mixing-tube on the other. Within the burner (the holes in which are directed inwardly) rests the grid D, "adapted to receive the heat of the flames and deflect it downwards unobstructed in any way by the burner which surrounds it towards the tray which may be arranged in one of the guides within the cooker."

Concluding their specification, the patentees say: "It will be noted that the flames from the burner are directed inwards, and are consequently disposed in the best manner both for boiling and for heating the grid, which can provide deflected heat over the entire surface of the food being cooked within the cooker, as there is no intervening pipe or other obstruction to interfere with the direct radiation of the heat on to the food being cooked."

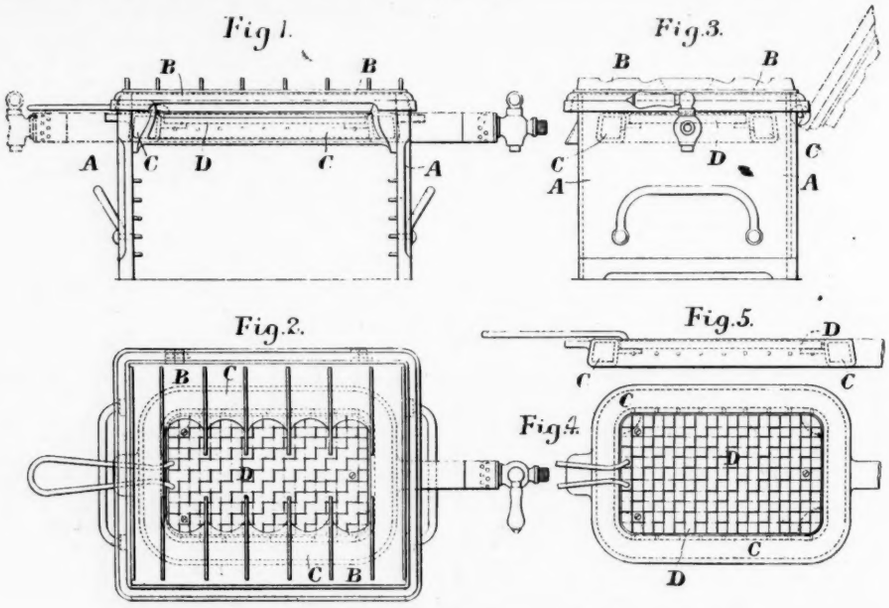
APPLICATIONS FOR LETTERS PATENT.

18,271.—Ingram, T., "Acetylene-gas plant." Aug. 7.
18,313.—Thorp, F. & H. T., "Prepayment meters." Aug. 7.
18,390.—Plantinga, P., "Discharging vertical retorts." Aug. 7.
18,413.—Francis, A. S., "Gas-burners." Aug. 7.
18,437.—Crawford, W. W., "Destructive distillation of carbonaceous substances." Aug. 8.

Good Coal Stocks at Camborne.—The half-yearly meeting of the Camborne Gas Company was held last Friday. The Directors reported a profit of £721, and recommended a dividend of 3 per cent., payable at the discretion of the Board. The Engineer (Mr. S. J. Ingram) reported that the Company had purchased a large stock of coal; and if there was slight delay in the payment of the dividend, they had an extra supply of coal sufficient to carry them far into the winter. The report and statement were adopted.

Fusing of Electric Wires.—A confectioner's shop at East Ham was the scene of an explosion and fire on Monday of last week. The premises are lit with both gas and electricity; the latter being supplied by the East Ham Borough Council. Suddenly the shop was left in darkness, whereupon a man present went down to the basement and turned off the main switch. A loud explosion was followed by a lighter one; but the man managed to escape, though not till his face and hands had been badly burnt. The flames extended to the upper part of the house, but were soon extinguished. It is believed that the outbreak was caused by the fusing of the electric wires.

Lea Bridge District Gas Company.—The Directors, in their report to be presented at to-day's meeting of shareholders, state that the increased quantity of gas sold during the half year to June, as compared with the corresponding period of 1913, was 18,385,300 cubic feet, equal to 8·54 per cent. The price of gas was reduced by 1d. per 1000 cubic feet as from Midsummer. The amount available for dividend (including the sum of £5542 brought forward) is £13,009. The Directors recommend the declaration of dividends of 5 per cent. per annum on the preference stock and of 6½ per cent. per annum on the consolidated ordinary stock (both less income-tax), and that £732 be carried to the credit of the reserve fund. This will leave £5582 to be carried to the next half-year's accounts. It is mentioned that additional capital having been required to extend the Company's manufacturing plant £15,000 of consolidated ordinary stock was offered for sale by auction in March, and was all sold at an average price of £124 16s. 7d. per £100 of stock; the net amount of premium realized (after payment of costs of sale) being £3525.



Chandler's (South Metropolitan Gas Company) Gas Cooking-Stove.

MISCELLANEOUS NEWS.

SOUTH METROPOLITAN GAS COMPANY.

The Ordinary Half-Yearly Meeting of Proprietors of this Company was held last Wednesday at De Keyser's Royal Hotel, Victoria Embankment, E.C.—Mr. CHARLES CARPENTER, D.Sc., in the chair.

The SECRETARY (Mr. F. M'Leod) read the advertisement convening the meeting, and the minutes of the last ordinary general meeting.

The Company's seal was affixed to the "Register of Proprietors."

THE CHAIRMAN'S SPEECH.

The CHAIRMAN said: Ladies and Gentlemen,—I beg to move: "That the report and accounts now presented be received and adopted, and the report entered on the minutes."

THE EUROPEAN CRISIS.

Never in the Company's history has the meeting of its proprietors been called together under such a terrible cloud as that which now overshadows our country, as it does indeed the whole civilized world. I think, therefore, it will best accord with your feelings if, to-day, I only deal in a general way with the Company's position, and how this is likely to be affected by the hostilities into which our rulers have been forced against their will.

PRICE OF THE RAW MATERIAL.

With regard to our particular business, I do not think I need remind you that you are to-day in a different position from the shareholders in many industrial undertakings; and I think it must be a source of satisfaction to you that the industry of gas making is one which supplies a public necessity rather than a public want. This must be some consolation to us when we consider that the dividends which the Company have for many years been allowed by Parliament to declare upon the money invested in it have been very modest ones indeed. So far as we can see, at any rate in London—and I am now looking at our business from the commercial standpoint, which is one of the reasons why we are here this afternoon—there is no particular reason to believe that the consumption of gas is likely to be seriously affected. A very large proportion of our gas is used as one of the necessaries of life by the poor; and one cannot imagine that in the consumption of gas there is very great room for economy. Now of the three chief factors which govern its price, the maintenance and extension of its use is an important one; and we have every reason to believe that our position in this respect is a sound one. The other two factors are the price of coal and the return from residuals. The latter is not of itself unsatisfactory, but it becomes so when taken in conjunction with the one unsatisfactory item of our balance-sheet—that is, the cost of our raw material, coal. I need not remind you how we have been struggling against the high cost half year after half year. At the time this report was drafted, we all felt that we were nearing the period when we might reasonably expect some relief by a return to those more normal prices upon which our business has been built up. We felt that for some time past we had been compelled to pay an unreasonable figure for coal; and in this respect I should like to say again what has been said before from this chair—that the price we have been called upon to pay is not a figure which has been raised to its present pitch by legislative requirements. It is quite true that the Legislature has required additional precautions to be taken with regard to the safety of miners and the conditions under which they work; but I ask you to believe me when I say that this amount, when turned into cost per ton, would be a very small fraction of the great increase we have had to pay. We do not, of course, object to pay something in respect of the additional charges. We think it right that the miners should work under conditions as safe, sound, and secure as Science can make them; but the cost of them is a very small proportion of the total increase that we are charged for coal. When the state of affairs we look forward to is reached, we shall be in a different position with respect to making two ends meet. There is no reason to fear any interruption in the present increase which has taken place in the consumption of gas and in the maintenance of the present prices for residuals (which I think are fair ones) or something like them; and we shall be in a position to pay our way without having to report ever recurring deficits upon our six months' working.

COAL STOCKS AND RESIDUALS.

We have never in all our history held anything approaching such high stocks of coal as we held on June 30 when the books were made up. I am sure that no one to-day can find any fault with our doing so, having regard to the fact that the shipment of coal from the Tyne has, only temporarily we all hope, stopped; but it involves a considerable amount of our money being locked up in those very heavy stocks. What is true of coal is also true of residual products. It so happens that, owing to circumstances we are not able to control, our stocks of all residuals are heavy. Coke is especially heavy; but we do not regard this fact with any apprehension, because it is quite possible that the existence of large stocks of fuel in London which can be utilized with the greatest readiness for steam raising, and many other purposes, must be a valuable asset to the Metropolis at the present time.

CO-PARTNERSHIP IN THE COAL TRADE.

With regard to the price of coal, it does seem to be a pity that some scheme of co-partnership or profit-sharing cannot be introduced among the miners, for they would then have a direct interest in the reduction of expense, both by economical working and greater output from the very costly plant installed. For working a coal field, you have to spend, say, £300,000 in sinking each shaft; and the more coal you can turn out of the shaft the better you will be able to supply coal at a reasonable price. At present the miners have no interest of this sort at all. We had a very good illustration a little time ago as to the direction in which their interest does lie, when they calmly proposed in Scotland to work only four days a week in order to maintain the price for coal; their particular interest being that they would get more wages as a result. Their basis of payment seems to me an altogether illogical and an irrational one. With our long experience, we know what we are talking about when we speak of co-partnership, and we know what co-partnership will do. It has been a success, not only with ourselves but in the gas industry as a whole. And if co-partnership is a necessity—and I hold that it is under the conditions of gas supply—it must be still more necessary to the coal-mining industry which is of not less importance than the supply of gas. If such a state of things as that could be brought about, I feel sure that we should have fewer complaints of bad working and reduced output by the miners, which it is not infrequent to hear from the North of England. Above all, we want our raw material, coal, at a fair price, and not one unfairly inflated by supplying the requirements of foreigners. With regard to the stock of coal in hand, which was on June 30 the largest in our history, I may say that we have now got enough to last us for three clear months' working; so that we can go on from to-day if we do not receive—I cannot conceive it to be possible, but if in fact we do not receive—a single ton of coal for three months, we can go on working for that period. I think, therefore, you will agree with me that we have amply fulfilled our obligations to the public, our consumers, in laying in a sufficient and proper stock. In connection with this I will just remind you that we have at the East Greenwich works a railway siding which puts us into connection with the main lines of the country. When we proposed to do this some years ago some of our critics regarded it as an unnecessary luxury; but I can assure you that it is a great relief to us to know that it is available to bring in coal in emergency by land if required, as well as for sending out the residuals we produce.

INCREASED CONSUMPTION.

In reference to the item "Sales of Gas," which appears later on in the report, I am pleased to be able to assure you that our business is in a healthy condition. The report tells you that we have had an increase in consumption of rather more than 2¼ per cent. This is a satisfactory result when regard is paid to the magnitude of the figures on which the increase is calculated. This increase of 2¼ per cent. is enough to supply a very fair-sized town. Although the figure may appear to be a small one on paper, yet, when you consider the large consumption upon which the 2¼ per cent. is based, you will, I think, agree with me that it is a satisfactory figure in the half-year's working. It is also one which gives us great encouragement in our efforts to maintain the high standard of quality we have already reached, although we have not yet attained our goal.

QUALITY OF THE SUPPLY.

As the report tells you, there are three important qualifications which gas has to possess—lighting, heating, and purity. We occupy the proud position of sending out the highest quality of gas in London; and we are sure that the continued popularity of gas has arisen from the care and attention we have given to this important part of our duty. We shall not relax our efforts in this respect until we achieve the very high standard towards which our efforts have been directed for a long time past.

PREPAYMENT METERS AND GREATER SECURITY.

The same statement of prosperity is true with regard to our slot-meter system. The success of this system has been phenomenal; and I think it is only right that I should admit an error of judgment on the part of gas undertakings, into which they fell when they first adopted the original design of the mechanism by which gas is supplied when a coin is inserted in the meter. We, in common with many undertakers—we were not the absolute pioneers, but we were very early in the field with regard to the slot meter supply—thought it would be sufficient for each meter to have attached to it a locked drawer into which the mechanism of the meter discharged the coins as inserted by the consumer. Well, the locked drawer has proved in a great many cases a mistake; and on all the meters which we have been for some time past purchasing we have provided, in substitution for the locked drawer, something in the shape of what is practically a miniature iron safe; and it is this iron safe which now receives the coins from the prepayment device. All the meters in use are being improved in this respect—it would be too big a job to alter them all at once, it must be only a gradual process; and we are taking the districts in which the greatest difficulties with regard to this matter have been experienced, and gradually spreading out, so that in time the whole will be altered to the newer pattern. This matter is one to which we call attention in the report; but as it is one about which some misapprehension does exist, I thought it would be interesting if I took the opportunity this afternoon of amplifying this.

INCANDESCENT LIGHTING.

I want now to deal with a matter of more general interest. From the day when my predecessor, Sir George Livesey, began his famous campaign in favour of low-power gas, its intrinsic lighting value has been becoming less and less valuable. It is true that self-luminous flames are still found essential by many users of gas; but by far the greatest bulk do not rely upon this intrinsic quality of self-illumination, but use their gas in bunsen burners, to which what is called a "mantle" is applied to obtain luminosity. Well, we have for some years past been pushing this use of gas to every extent in our power, and have taught the great bulk of our consumers to rely upon the mantle for illumination, and have encouraged them to purchase the best type of fittings for its profitable use. Now if we had pursued this policy without taking steps to see that the consumers were protected in the matter of mantle supplies, I should consider we were as negligent in our business, to use no stronger word, as if we had encouraged them to use gas for their many wants without ourselves providing a stock of coal for emergency. Well, I am glad to be able to assure you that we have fulfilled our obligations in this respect. Our stores contain a stock of mantles sufficient to meet our consumers' requirements for some time to come; and when I tell you that, of the mantles used in England, something like 75 per cent. have been coming over from Germany, you will see how important a matter this has become.

CHEMICALS FOR MANTLES.

But we have not stopped here. The chemical product from which the mantle derives every atom of its luminosity is with one single exception, to which I will refer directly, manufactured abroad. Having regard to our obligations to the consumers of gas, to which I have

referred, we did not consider this was a satisfactory state of affairs; and some time ago we purchased a considerable stock of these chemicals, which are to-day intact in our stores ready for use when the emergency arises. Now, you may well ask yourself how it was that with such an important manufacture as that of nitrate of thorium (which is the name of the indispensable chemical to which I referred as being essential for the manufacture of incandescent mantles) we were content to rely upon the Continent for our supplies. I am sorry to say it is the old story over again, as in the case of the coal-tar dyes, and you will have observed how the shortage of these is affecting our dyeing industries to-day—namely, the lack of enterprise and encouragement given to the British manufacturer. It is, however, a very great satisfaction to me to be able to say to-day that no such charge can be levelled at the South Metropolitan Gas Company.

THE COMPANY'S STOCK OF THORIUM.

Almost the whole of the nitrate used in England to make mantles was prepared by chemical works on the Continent; but there is I believe one exception to-day, and that exception is an undertaking on which, with the help of a firm of chemical manufacturers, you spent a good deal of money some years ago in laying the foundation. Our ample supply of nitrate of thorium has been an extremely useful asset to us, because as long as we possess it we are in the position of being able to say, if any unfair suggestion is made with regard to the price of mantles, that we are on a large enough scale to-day to start making our own. We do not want to do it; but, if we are driven to it, the suggestion is not likely to fall to the ground through want of material.

THE CONTROL OF SUPPLIES.

The stock we have kept has been very useful to us in this respect, and, under the peculiar circumstances which I have just narrated, the fact that there is to-day hardly any nitrate of thorium available for the manufacture of mantles is rather a startling one. I think that the number of firms who make mantles, and who are possessed of stock enough of chemicals to carry on is an extremely small one, because it has been part of the policy of the German Convention who have controlled the supply of nitrate of thorium, only "to feed English makers with a spoon," so as to keep them in the position of dependents. The stock of nitrate of thorium which we have will enable us to overcome any difficulty not only of our own, but I think I may say with regard to others as well—even if the interruption of supplies continues for a considerable period. So, you will agree that the provision we have made in laying in this stock was a wise and proper one. [Hear, hear.]

EXTENSION AND ENCOURAGEMENT OF THE CHEMICAL INDUSTRY.

With regard to this matter, I do hope that the lesson we can learn from the supply of thorium will be applied, when things have come to the successful issue we all hope and pray for, on a more general scale. When the present unfortunate war comes to an end, I hope that we in Great Britain will take to heart some of the lessons which Germany has taught us—among which not the least important is the need for the utmost support to be given to the extension and encouragement of the chemical industry within our realm. I need hardly remind you how we lost from England, though we discovered them in England, the manufacture of the coal tar dyes. We lost this industry partly through want of enterprise and partly through the lack of encouragement given to our manufacturers. To-day England is asking for dyes as she is asking for thorium. But she cannot get them because their supply is interrupted. I do hope that we British will take this to heart in such a way that we shall derive benefit therefrom in the future.

CO-PARTNERSHIP.

The only other matter I want to touch upon this afternoon is with reference to co-partnership; and you have often heard from me the expression of my sincere belief in the deep-rooted character of its foundations. I should like to give you to-day one or two illustrations which I hope will show you that all we have said—and much more is deserved—of our co-partnership is true. I mean particularly with regard to the difficulties with which the country is now faced. It was on the Saturday before last Bank Holiday that the first batch of our men had notice to mobilize. They were the Royal Naval Sick Berth Reserve attached to the St. John's Ambulance Corps; and between eighty and a hundred men mustered on the next Sunday morning. Three days later—that is a week ago to-day—our Co-Partnership Committee met to consider what was to be done for the wives, children, and dependants of those who had left and were leaving to serve their country—all grades occupying different positions in the Company's service. They unanimously and enthusiastically decided to raise, in conjunction with the Company, a fund sufficient to provide 2s. per week for every child and 10s. per week each for the wives and dependants of those who have been called away. I pointed out to the meeting that the monetary obligation they were undertaking was a very heavy one—very much heavier indeed than they undertook at the time of the Boer War, and it is interesting to know that even to-day allowances are being made to children still under the age of 15—dependants left at the time of that War. I told them that the number of Reservists in the employ of the Company had been very largely increased, and therefore they were undertaking a very big duty. We have found that the class of men from whom the Reservists and the Territorials are drawn is a very useful one to us—they fill posts of responsibility, looking after various processes requiring careful attention; and preferably trained men are employed for such work—men trained in either the Army or the Navy. The result has been that, in the present circumstances, we have lost a very large number of men—something like 700 are now liable to be called up, and a large number have already gone. The reply of the Co-Partnership Committee was enthusiastic and unanimous: "We don't mind that; we will subscribe whatever may be required, up to any amount that may be required." You know, one sometimes hears it said that the working class is not as patriotic to-day as they were in other times. I cannot speak generally, but I can speak in particular of the thousands of men employed by the Company; and I say that this was a remarkable response which the men made to the call upon them. [Applause.] The Committee met on the Wednesday after last Bank Holiday; and a small Committee is now actually at work and the allowances are being actually paid. I think you will agree with me that this is a very fine example of the rapid mobilization of forces which are no less necessary than fighting ones in a contingency of this kind. I hope that what I have been able to tell you with regard to our co-partnership and the conduct of our men will afford additional proof, if any were necessary, of the soundness and value of the system in uniting in one endeavour the energies of employers as well as employees.

CONCLUSION.

Ladies and Gentlemen, these are all the remarks I propose to make with regard to the report; but, if any proprietor desires to ask any question, I shall be pleased to answer it. Before doing that, I will ask Mr. Bush to be good enough to second the resolution. [Cheers.]

Mr. FRANK BUSH: Ladies and Gentlemen,—After the extremely interesting and lucid statement which you have heard from our Chairman, it is unnecessary for me to say anything; and I formally second the proposition before the meeting—"That the report and accounts be received and adopted." Just one word more. With regard to the 700 employees of the South Metropolitan Gas Company, be they employed in this country or be they employed on foreign soil, I can say this of them—that I am sure they will all quit themselves like men. [Cheers.]

A SHAREHOLDER'S INQUIRY.

Mr. HAVELOCK-WEST said he wanted to ask a question on the balance-sheet with regard to No. 6 account and the item "Reserve Fund, £196,106 5s. 4d." How was this invested; and what other reserve had the Company on a capital of £8,000,000? He thought they ought to have some other reserve fund besides this one. He had noticed that some companies were trying to defer the payment of their dividend; but as the South Metropolitan Gas Company had a great number of small shareholders, he hoped the Board would not defer the payment of a dividend on the 12th prox.

The CHAIRMAN: I will answer that question at once. A considerable portion of the reserve fund has been invested in ordinary "Trustee Stocks." We shall be very pleased to show the list to any shareholder this afternoon who desires information. This reserve fund is applicable only to the payment of dividend. The best reserve we have got is that we have, as I endeavoured to explain in my speech, a great reserve in the fact that we could if driven to it raise our price of gas and at once recoup ourselves for any extraordinary demands made upon us. Supposing it was decided to increase the price of gas by (say) 4d. per 1000 cubic feet, the figure which is now being charged for gas north of the Thames, the reduction in the dividend would be only 10s. 8d. per cent. So that I think you will agree with me that we have in our business itself a very satisfactory, if a latent, reserve. Then, with regard to the payment of the dividend, this matter has been very carefully considered by the Board, and we felt—particularly having regard to the large number of shareholders whose holding is comparatively small, and who rely upon their holdings for a considerable portion of their income—that the circumstances were such as not to suggest the withholding of a dividend. So that a resolution will follow this one suggesting that a dividend be paid and the warrants transmitted to the proprietors in the ordinary way. [Cheers.]

The resolution was put and carried unanimously.

THE DIVIDEND.

The CHAIRMAN: I have now to move:

> "That a dividend at the rate of £5 9s. 4d. per cent. per annum be now declared, and that the warrants be transmitted to the registered addresses of the proprietors by post."

I will ask Mr. Mews to be good enough to second the resolution.

Mr. JOHN MEWS: The dividend question is a very serious one which has agitated the minds of the Board for the last fortnight, as to what we should do in regard to the payment of a dividend. There were, of course, three courses open to us—to pay none at all, to pay a portion, or to pay the whole of the statutory amount. The Board unanimously came to the conclusion, as our Chairman has told you, to pay the full amount, and for this reason partly: If you look at the balance-sheet and accounts you will see that the profit-sharing amount for the year is something like £50,000—that is, at the present rate of £5 9s. 4d., something like £2700 for the year. That is to say, half of this, or about £1300, for the half year. When so many of our men are going away on the service of the country, it is felt that they should have every opportunity of getting what many of them thought they were going to get, because this war has come so suddenly upon us that nobody has been able to make provision to tide over the next few months while it lasts. It would therefore be very hard, from our point of view, that anybody who thought himself entitled to receive a dividend, the ordinary dividend, should not be able to receive it. Therefore, I am sure you will agree with me and the rest of the Board that the proper course for us to pursue has been adopted. [Cheers.]

The resolution was put, and carried unanimously.

VOTES OF THANKS.

Mr. W. R. LEE said he felt sure that the meeting would not like to close without passing a vote of thanks to the Chairman and Board of Directors. The Chairman had prefaced his remarks with the words that we met under dark clouds; but he thought it was the opinion of the meeting that, however dark the clouds might be, the Board of Directors would see them through. The extremely interesting speech of the Chairman was full of optimism; and they hoped that within six months all the dark clouds would disappear, and then the anxieties of the Directors would be removed. The resolution of the Directors to pay a dividend was an excellent one. Of course, none of them would quarrel with it; and the reasons given by Mr. John Mews were all sufficient. When at their works the other day, he read notices referring to the provision made for the maintenance of the wives and families of those going to the front. They expected the Company to make these provisions, as they had done in the past. All honour to those in the Company who had put their hands into their pockets for the benefit of their fellow workmen. With regard to the price of gas, he congratulated the Board on not raising it, because an increase of even 1d. per 1000 cubic feet would be a very great hardship on the individual. With regard to the excellent remarks by the Chairman

about coal and mantles and other things, he thought that it would appear to be ungrateful if they parted without an expression of thanks to the Chairman and the Board for what they had done. They all felt the greatest confidence in the Board, and whatever might be necessary to be done in the coming months by the Board would meet with their fullest approbation. If they only could hope that, as a result of the war, the spirit of co-partnership might be strengthened, then the war would not have been in vain, and every man, whether employer or employee, would find that his interests were common and identical. He begged to move the vote of thanks.

Mr. EDGAR said he had great pleasure in seconding the resolution. During the past half year the Company had done very well, taking into account all the difficulties they had to overcome; and he thought that, with a little patience, there was a brighter outlook for them all.

The resolution was passed, with acclamation.

The CHAIRMAN: Ladies and gentlemen,—Speaking for myself and my colleagues on the Board, I thank you very sincerely for this renewal of your confidence in us. The times through which we are passing are very anxious ones; but I can assure you that we shall do our best in order to overcome any difficulties which may from time to time arise. Before I sit down, I would like to say a word on behalf of the staff, without whose efforts our work would be in vain. Whatever you may think of the Board, I must say that you have an excellent staff; and I feel that, so long as we are served by such a highly-qualified, and, above all, such an enthusiastic and loyal staff as we have got, our progress in the future, despite all obstacles, will be a satisfactory one. In proposing a vote, I couple the names of our two representatives of the technical and commercial sides of the business—Mr. Gibb and Mr. M'Leod.

A SHAREHOLDER seconded the vote; and it was carried unanimously.

The CHIEF ENGINEER (Mr. W. Doig Gibb) said that, on behalf of the technical staff, he thanked Mr. Carpenter for the very kind words he had spoken. They had certainly come through very strenuous times, and there were still more such ahead; but with the co-partnership spirit, he was quite certain they would win-through in the end with credit to themselves and satisfaction to the Board and the proprietors.

The SECRETARY (Mr. F. M'Leod) said that, on behalf of the staff, for whom he had been asked to respond, he could not do better than re-echo the words uttered by Mr. Gibb. He was confident that all his colleagues, whatever duty they were called upon to perform—whether to carry arms in defence of the Empire or help maintain the commercial soundness of the Company—they would give a very good account of themselves. On behalf of the staff he thanked the meeting for their vote. He thought it might interest the meeting to know that at their two principal stations they had excellently appointed rifle-ranges, at which hundreds of co-partners were now practising up to 10 o'clock at night learning how to shoot straight; so that whether they stayed at home to mind the shop or were called upon to fight, they would be just as efficient in the one place as in the other.

The proceedings then terminated.

SOUTH SUBURBAN GAS COMPANY.

The Ordinary Half-Yearly Meeting of this Company was held last Friday, at De Keyser's Hotel, Victoria Embankment, E.C.—Mr. CHARLES HUNT in the chair.

The SECRETARY (Mr. Wilfrid Wastell) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

THE WAR AND THE EMPLOYEES.

The CHAIRMAN, in moving their adoption, said: I have been in some doubt as to whether you would wish me to trouble you on this occasion at any length, having regard to the momentous and absorbing issues with which we find ourselves confronted. With your permission, however, I will proceed as usual, feeling persuaded that this is the best course to pursue. But first let me say that out of a large number of the Company's employees who are liable to be called out for active service, 48 have already gone. They have been assured that places will be kept open for them, and, as far as possible, those which they—it is to be hoped only temporarily—relinquish. Arrangements have also been made for the support of their wives and families during their absence, the cost of which will be borne equally by the Company and the employees, who, I am proud to say, promply expressed, through the Co-Partnership Committee, their desire to co-operate. In addition to contributing to the general fund, the staff has voluntarily and generously undertaken to carry-on without extra assistance, as far as may be found practicable, the work of those of their number who have been called to the front. In one word, the spirit displayed by all classes of the Company's employees in the present crisis is beyond all praise.

THE NEW ACT, AND THE CHEMICAL MANUFACTURERS' ATTACK.

In moving the adoption of the report and accounts, which I now do, the first important matter to which I should like to refer is the safe passage through Parliament of our Bill for the acquisition of the land at Erith. This secures to the Company a new manufacturing site adequate both in extent and in resources to satisfy the Company's utmost economical aspirations for many years to come. The cost of the 190 acres or thereabouts, stretching from rail to river, is represented by the amount of £19,671, at present shown as being in suspense, but which will hereafter be transferred to the capital account. The only opponents of the Bill in Committee were our old friends, the Alkali Manufacturers' Association. It will be recollected that in session of 1912, at the instance of the Association, various Committees on Private Bills in both Houses of Parliament prohibited certain gas undertakers, this Company among them, from purchasing gas residuals to work up with their own, and that this treatment aroused so much indignation, as being contrary to the freedom of trade and the public interest, that Parliament was induced to appoint a Joint Committee of the two Houses to inquire fully into the matter. The Committee met later in the year; and, after hearing evidence of witnesses and speeches of Counsel for the best part of eight days, reported entirely in favour of the contention of the gas industry, and consequently against such restrictions as had already been imposed. It was naturally supposed that here was an end of the matter, and that gas undertakers would thereafter be left alone in regard to it. Last year, in fact, the Alkali Association took no proceedings; but this year they opposed our application for a repeal of the prohibition as regards the new land, with the result that the Committee decided to limit the power to purchase residuals to a quantity not exceeding one-third of the quantity of the like residual made by the Company in the same year. It is difficult to see how such a decision as this can be logically defended, because if the purchase of residuals from other gas undertakings be undesirable, merely to limit the practice seems only to beg the question, If, on the other hand—as could not but be concluded from the evidence laid before the Joint Committee—such practice is attended with advantage to the public, it surely ought to be, not reprobated, but encouraged. It so happens that Sir Harry Samuel, who presided over our Committee, was also Chairman, two years ago, of one of the Committees whose decision on this matter gave rise to the appointment of the Joint Committee. But why, it may well be asked, was this Joint Committee appointed, and why were the parties put to the considerable expense and trouble of appearing before it, if it was not intended that its findings should be regarded as authoritative on the subject? The sole witness for the opposition was Mr. William Pearce, a Member of Parliament, and Director of Messrs. Spencer Chapman and Messel, Limited, and Messrs, Wm. Pearce and Sons, Limited, chemical manufacturers. Mr. Pearce made it clear that, although representing the Alkali Association, he was not interested in ammonia. He is, however, largely interested in sulphuric acid, of which his firm are manufacturers. This acid, as is generally known, is required for the manufacture of sulphate of ammonia; and it is consequently now used in a very large number of gas-works. It is, or can be, made from spent oxide, which is also obtainable at every gas-works. But, for reasons which need not be entered upon, its supply is still very much in the hands of private chemical manufacturers, who appear from the figures that I am able to place before you to have been making a very good thing out of it. This firm of Messrs Spencer Chapman and Messel formerly supplied the South Suburban Gas Company with sulphuric acid, their lowest price for which, down to the year 1908, was 47s. 6d. per ton. In that year, however, the South Metropolitan Company appeared upon the scene as acid manufacturers, and Messrs. Spencer Chapman and Messel's price tumbled down at once to 29s. 9d., a reduction of 17s. 9d., or about 36 per cent.! In fixing this figure, they seem to have overestimated the ability of the South Metropolitan Company to compete; and so they went to Sir George Livesey—then the Chairman of this Company as well as of the South Metropolitan Gas Company—who "out of the goodness of his heart," as was explained by Mr. Carpenter to the Joint Committee, gave them an additional 5s. per ton—making their price 34s. 9d. per ton, or still about 27 per cent. less than their previous one. At the same price, they also obtained our contract the two following years. But in 1911, the South Metropolitan Company, having in the meantime improved their plant, offered to supply at 32s. 6d. per ton, and were given the contract at that price. I need only add that, as compared with the price of 47s. 6d., which ruled in 1907, this action of the South Metropolitan Company in embarking upon the manufacture of the acid, has—while doubtless profitable to it—saved this Company no less than £7200.

THE ENLARGED DIRECTORATE.

With regard to the *personnel* of the Board, to which reference is made in the report, we are very glad to have secured the services of Mr. B. R. Green, whose technical knowledge and administrative experience combine to render him a very useful addition in succession to the late Mr. Robert Morton. Mr. Green was, as you are probably all aware, formerly Engineer and Manager of the late Mitcham and Wimbledon Gas Company, and a Director of the late West Kent Gas Company. He is now a Director of the Wandsworth, Wimbledon, and Epsom Gas Company, which was formed two years ago by the union of the Mitcham undertaking with those of the Wandsworth and Epsom Companies. Notice has also been given of our intention to propose at this meeting to increase the number of Directors from six to seven, under the provisions of our new Act. As to who shall be the additional Director, it will be for the proprietors to determine; but we do not make any secret of our hope that your choice may fall upon Mr. Alexander Dickson, whose term of office as Special Director under our 1912 Act has now expired. Mr. Dickson's election as a permanent Director would give great satisfaction to us who have been his colleagues for the last two years, and who appreciate very highly indeed his services to the Company, especially in regard to that part of the undertaking which he fitly represents as the former Chairman of the late Bromley and Crays Company. It would also be in accordance with the wish which was expressed on the subject at the last general meeting.

LARGE INCREASE IN GAS BUSINESS; POOR RESIDUALS MARKETS.

Turning now to the accounts, the most favourable—I might almost say the redeeming—feature of these is the very substantial and (as regards this Company) almost unprecedented increase of 7·3 per cent. in the sales of gas. This increase has occurred most opportunely to counterbalance to a considerable extent, though by no means fully, a further and serious falling off in the returns for residuals, amounting, as compared with the corresponding period of last year, to about £11,500. The markets for coke and sulphate of ammonia—especially for coke—have been in a very unsatisfactory state. At the present time, business in sulphate of ammonia is entirely suspended, and whatever may happen in the immediate future, any permanent return to the higher prices of a year or two ago is not to be looked for in view of the increased production consequent upon a great development in the use of recovery coke-ovens, and also the production in increasing quantities of synthetic ammonia, the nitrogen for which is derived from the atmosphere, instead of from the distillation of coal. The demand for tar has also fallen off. Coke has dropped so low in value that it is difficult to imagine that it can go any lower; but just now it is in increased request owing to the partial interruption of coal supplies. The Coke Committee representing the various gas undertakings

has done its best to introduce new uses for coke; and Mr. Edward Allen, the able Engineer of the Liverpool Gas Company, when giving evidence recently before the Departmental Committee on Smoke Abatement, drew attention anew to the desirability of abolishing in its favour the use of coal in the household. This is the very reform which was so strenuously advocated by Winsor, the founder of the Gas Light and Coke Company, more than a hundred years ago; and yet the supremacy of coal, with its "filthy black smoke," so fitly denounced by Winsor, has never been seriously challenged, until within the last few years. The modern gas-fire has, however, already achieved a very notable degree of success in this direction, and is in no way disposed to be ousted by coke, although prepared no doubt to make common cause with it against coal and its attendant drawbacks. Mr. Allen has rendered the gas industry important service by giving renewed prominence to the great superiority of coke over coal when used under suitable conditions in the domestic grate. He places the radiant efficiency of coke as 44 per cent., as compared with only 19 per cent. in the case of coal—figures which appear to indicate that the general substitution of coke for coal should only be a matter of adaptability under ordinary conditions; and it cannot be too widely known by householders that, at the present time, large stocks of this very useful fuel are available. It will be seen from the accounts that this Company has resumed the production of carburetted water gas, which, although costing somewhat more than coal gas, has the merit of withdrawing from the market coke of which it might otherwise be difficult to dispose.

THE DIVIDEND AND THE PROFITS.

Having regard to the great falling-off in the receipts for residuals, coincident with the continuance of abnormal prices for coal under last year's contracts, it can hardly be a matter for surprise that the balance of individed profits must again be drawn upon for a considerable amount to pay the full statutory dividends. The wisdom of paying these dividends, in face of such a weak market for residuals, might reasonably be doubted, were there not grounds for believing that something like the worst in this respect has now been reached, and also that sensible relief should henceforth be experienced from the lower prices for coal and oil referred to in the report. These came into operation at the commencement of the current half year, while a further increase in the sales of gas may be expected to result from the great development of the undertaking during the last two years, although not perhaps to the extent that was so fortunately experienced during the half year under review. In connection with this, it may be mentioned that the reconstructed show-room at Bromley has been opened, and is proving to be a marked success. Under normal conditions, therefore, the next accounts should show an increase of profit almost—though not perhaps quite—sufficient to obviate the necessity for further recourse to reserves; and in succeeding half years this improvement should be more apparent. But the conditions with which we are faced are unfortunately anything but normal; and what may be the position in the immediate future no one can tell. I am glad, however, to say that our supplies of coal and oil are ample; while we know beyond the shadow of a doubt that, so far as the employees of all grades are concerned, everything will be done that is humanly possible to continue the success of the undertaking under all circumstances. Between them and the Directors the best of terms continue to exist; and it is no small relief in times like the present to be able to rely on their hearty co-operation. As to what co-partnership may and does mean in this connection, let me refer to a comment that recently appeared in the "JOURNAL OF GAS LIGHTING" when noticing our recent Co-Partnership Festival at the Crystal Palace, which, as you are aware, is held annually by the South Metropolitan and South Suburban Companies. After mentioning the contented look in the faces of both the employees and their wives, the writer says: "This contentment, which arises from the substantial benefits accruing to the employees through co-partnership, is the strongest argument in favour of the system from the employer's point of view, for it means good service, and all the advantages that come to the undertaking therefrom. Each year that passes, it is clear, serves to strengthen the faith in co-partnership of those who work under it." The contentment to which the writer bears witness is to-day alloyed by the anxiety which weighs upon us all, but which, as if by magic, has transformed the whole Nation into one vast family of co-partners. That the spirit of unity thus invoked will be permitted to accomplish its righteous purpose, ought we for a single moment to doubt?

Mr. B. R. GREEN seconded the resolution. In doing so, he said he should like to add a few words to what the Chairman had said, in order to draw the special attention of the proprietors to the manufacturing returns which were shown in the statement before the meeting that day. He did not suppose that many of the proprietors analyzed the figures, and made the special study of them that others did; but he should strongly urge them to do so because of the interest. If they did this, they would, he was quite satisfied, agree that the returns were exceedingly good; and they would be greatly impressed by them. They would also agree that they reflected a masterly management and unity of effort on the part of all concerned, which it would be difficult to excel. That there was a deep bond of unity among the men in the Company's employ was, he thought, proved not only by the excellence of their work, but by the *esprit de corps* displayed in the exceedingly generous offer they had made to contribute towards the support of the wives and families of their comrades who had been called upon to serve their King and country. It was a most laudable action on their part, and worthy of the very highest commendation. He would like to add a word about the recent amalgamation. The effect of the amalgamation had been so apparent in the reductions in the price of gas in the whole of the districts, in improvement in service to the consumers in many of the districts, and in the increase of dividends the stockholders were enjoying, that he sometimes felt that the advantages of the amalgamation had not been sufficiently extolled. Especially was this so when one reflected upon the vicissitudes experienced during the past year, and which might possibly have to be met again in consequence of the war. One wondered what might have been the effect upon the amalgamated Companies, especially the smaller one, had they remained separate. They did know that, united as they now were, they stood in an eminently strong position. Speaking for the smallest of the three Companies—the West Kent—which, by the way, he had heard described as the "baby" of the union, he could only say that it had proved to be an exceedingly healthy infant, and it must be very gratifying to the consumers and stockholders alike to know that the child was being brought up in the way it should go, to the advantage of all.

The motion was unanimously agreed to.

THE DIVIDENDS.

The CHAIRMAN moved the declaration of dividends at the following rates per annum less income-tax: 5 per cent. on the preference stock, 6 per cent. on the ordinary stock, and 5½ per cent. on the West Kent ordinary stock. He remarked that the Directors had never had any doubt as to their obligation to pay the dividends as usual, if only the money was forthcoming, as to which he was glad to say that on application to their bankers (the London and South-Western), no difficulty whatever had been raised. Therefore, the proprietors might expect to receive their dividend warrants at the usual time.

Mr. GEORGE ROSS seconded the motion, which was unanimously agreed to.

THE DIRECTORATE.

The CHAIRMAN next proposed "That, pursuant to the powers conferred by section 48 of the South Suburban Gas Act, 1914, the number of the Directors be increased to seven; that Alexander Dickson, Esq., be elected an additional Director of the Company, to hold office until the first ordinary general meeting in the year 1917; that the order of rotation to which the Directors shall go out of office be, and the same is hereby, modified, so that three Directors shall go out of office at the first ordinary general meeting in the year 1917, and thereafter at the first ordinary general meeting in every third year, and two Directors shall go out of office at the first ordinary general meeting in every other year."

Mr. HUGH WYATT, in seconding the motion, remarked that, during the considerable time he was on the Board of the Bromley Gas Company, and afterwards of the Bromley and Crays Company, under the chairmanship of Mr. Dickson, he was often struck by his great ability to grasp the various positions that arose. He was quite sure the Board, if Mr. Dickson was elected, would continue to find him a very desirable Director. He would also represent the Bromley and Crays district, which was a considerable proportion of the Company's whole territory. He thought it was rather larger than the old South Suburban area; and it was very desirable there should be some one on the Board who knew the district and the inhabitants intimately, and who could be approached easily on any matter arising in regard to the district.

The motion was unanimously agreed to.

Mr. ALEXANDER DICKSON asked to be allowed to express to the proprietors his warmest thanks for the kind confidence expressed in him by the vote just passed. He felt he was deeply indebted to the Chairman and to his colleagues on the Board for the recommendation they were so good as to make in the report, the result of which had just been achieved. He sincerely trusted he might have the pleasure—for it was indeed a deep pleasure—to co-operate with the Board for many years to come.

VOTES OF THANKS.

The CHAIRMAN said there was one more pleasurable duty to perform. That was to propose a hearty vote of thanks to the officers and staff and employees generally for their excellent services during the past half year. He was sure the proprietors would feel that this was warmly deserved. The spirit which had been shown since the recent crisis arose was, as he had said in his address, beyond all praise.

Mr. CHARLES BEADLE seconded the motion, which was cordially adopted.

Mr. S. Y. SHOUBRIDGE said, on behalf of the workmen and the engineering staff, he thanked the proprietors for this renewal of their confidence and proof of their approval. He could assure them that the staff and men all appreciated the vote very highly; and it would stimulate them to do their best in the Company's service. He might say they were all aware of the great difficulty the Board had had to encounter in the past half year, in common with the Boards of all other gas undertakings, with regard to the price of coal and the slump in residuals. They were also conscious that, in the present half year, they had to face even greater difficulties. The workmen, and the engineering and clerical staffs, were unitedly and individually determined to do their utmost to maintain the prosperity of the Company under any and all circumstances. It might interest the proprietors to know that the clerical staff were united with the workmen in guarding the works against any attack that might be made upon them.

Mr. WASTELL, on behalf of the clerical staff, also thanked the Chairman and proprietors very sincerely for the more than kind expressions they had used. He could assure them one and all that they had again put their hand to the plough, and they meant to see this anxious time through with every effort they could put into their work.

Mr. BEADLE proposed, Mr. A. S. GEDGE seconded, and Mr. R. GARRAWAY RICE supported, a vote of thanks to the Chairman and Directors.

This having been heartily passed,

The CHAIRMAN, in replying on behalf of his colleagues and himself, said he was much obliged to the proprietors for their kindness. The present was undoubtedly a very trying time for all gas companies; but, with the support of the proprietors and of the employees, he felt sure they would pull through.

Lighting Question at Thurstonland.—A rather curious position of affairs exists at Thurstonland, near Huddersfield, where the local Council are endeavouring to get a public supply of gas for the village. The Council have written to the Honley District Council and the Kirkburton Gas Company, asking if they were willing to supply gas to the portions of Thurstonland in the Honley gas area, on payment of £1 a year as acknowledgment, and both have replied offering no objection to the other supplying the gas. Thus the Thurstonland Council were put in an awkward position; but on communicating further with the Honley gas officials, it was agreed that representatives of the Honley and Thurstonland Councils should meet and discuss the matter.

BOURNEMOUTH GAS AND WATER COMPANY.

The Late Mr. Hesketh Jones—Wimborne and Christchurch Gas Purchases—Substantial Increase in Business—The War and the Men.

The Half-Yearly Meeting of the Company was held last Friday, at the London Offices, No. 90, Cannon Street, E.C.—Mr. G. CRISPE WHITELEY in the chair.

The SECRETARY (Mr. H. A. Plumb, F.C.A.) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

The CHAIRMAN, in moving their adoption, said that, by almost universal consent, it was agreed that the best way of meeting the tremendous crisis in which the country was placed, was to calmly and quietly go on with the work that lay before them. It was in this spirit, and with that view, that he appeared before the proprietors to move the adoption of what he hoped would be considered a satisfactory report, and accounts which, he was quite sure, would bear inspection, and lastly, but certainly not least, to ask them to declare what they might call their usual statutory dividends, which they hoped to pay. Unfortunately the first words of his address were sad ones. Since the last meeting, and indeed since the issue of the report, they had lost a very old friend of the Company. Mr. Robert Hesketh Jones, full of years, and full of honour, had passed away. This was not the place nor was it the time to remind the proprietors of his kind heart and genial nature. To the Company he devoted a considerable amount of time and attention during the last fourteen years of his life in assisting and helping them. He occupied a position upon the Board of the Company, and gave them the benefit of his very ripe experience in the gas industry and in gas affairs. It was well known to most of the proprietors present that, during his long life, he was supported and loved by a helpmate who was with him a longer period than the lot of man usually provided; and he (the Chairman) was sure it would be the wish of the proprietors, as it was the desire of the Board, to offer to the kindly lady their deep sympathy in the irreparable loss she had sustained. To the position which Mr. Jones had resigned before his death, the Board had invited Sir Charles James Jessel, Bart., who was well known to all the proprietors, he (the Chairman) thought, from his position in the financial world, and the experience he had gained as a Director of gas affairs. He was the honoured bearer of an honoured name; and the Company were indeed fortunate in securing the benefit of his services. When the time came, as come it would, to ask the proprietors to agree and to support the election, he (the Chairman) had no doubt whatever that the result would be the unanimous ratification of the step the Board had taken. Now, the past half year would have been, under ordinary circumstances, an eventful one for the Company. They had, as the proprietors knew, taken over the Wimborne water district and the Christchurch gas district as from Jan. 1. The prices paid for the undertakings were provided for under the Act—one a fixed sum, and the other determined by arbitration. He only proposed to make two remarks with regard to the transfer at the prices named. The one remark was that the arrangements, as they ultimately turned out, fell somewhat hardly upon the accounts, because although they took over the Christchurch Company as from Jan. 1, with the necessary reductions that were made under the Act to the Christchurch consumers, it was not until nearly the end of the six months that they were enabled to avail themselves, for the supply of the district, of the benefits of the lessened cost of the production of gas at their own works. His only other observation with regard to the transfer was to make recognition of all the work done by their Secretary (Mr. Plumb) in the matter of the preparation of the accounts for the Christchurch arbitration. He worked exceedingly hard, and was very zealous in placing the accounts before the Arbitrator. Whatever the views of the Arbitrator with regard to the matter, it was not, at all events, the fault of Mr. Plumb if every fact and figure in favour of the Company was not fairly and clearly put before him. It was too early to begin to discuss, and this would not be the proper time, the result of the taking over of these two undertakings. They had begun well, and had a large and most satisfactory increase so far as the Christchurch district was concerned. The accounts would show, too, that, excluding both Wimborne and Christchurch, they had had during the half year an increase in the sales of gas of 9 per cent.—a most satisfactory and flourishing state of affairs—and that, in spite of the concessions they were bound to make under their Act with regard to the water consumers, the water revenue had increased by more than 3 per cent. With these facts before him, he could speak in the most eloquent way of the stability of the undertaking during normal times and under normal circumstances. Passing to the accounts for just a moment, there would be seen, in the capital account, an increase of nearly £100,000. They had had, of course, as all gas companies had had during the past six months, to deal with dear coal and oil and cheap residuals. They had, however, entered into new contracts for coal, and had effected these at a price which would, during the current half year, show a material saving. They must not be too proud and happy about this. There would unfortunately this half year be plenty of drawbacks to put on the other side. They might, however, congratulate themselves as to the one point on the right side. It would also be noted that there was a decrease in the credit balance of more than £4500. But he should like to point out to the proprietors that this was caused almost entirely by special charges of a non-recurring nature with regard to works displaced and compensation to leaseholds and officials. That was to say, they had written-off on account of works displaced £3500, tenants' compensations £1000, and, in addition, they had paid compensation to displaced officials of the Wimborne and Christchurch Companies to the amount of £1790. Therefore, in spite of the decreased credit balance, they might claim that, during the past six months, they had fairly and reasonably earned the dividend which they hoped the proprietors were going to declare, and which, he hoped, they were going to receive. The reserve stood at £58,000; and the proprietors would be interested to know that on June 30 the market value of the securities was £400 in excess of their book value. Of course, a good many things had happened since then; and all he should like to say in regard to this was that their securities were called "gilt-edged" ones. Seeing that everything must come to an end, there was no reason why, even after these troublesome times, there should not be a fair and reasonable recovery of the price at which they now stood in their books. That, at all events, was for the future. He should like—and he intended to do so under ordinary circumstances, but it was specially appropriate to do so at the present time—to tell the proprietors of the complete and pronounced success of the co-partnership scheme. It had been going on now for six years; and he had had opportunities—and not only at the annual meetings with the co-partners—of watching the success of the scheme. The proprietors would be interested to know that the Company had paid to the co-partners a total sum in bonuses of £15,265. They had now 491 members. The number of shares acquired had been 711; and the number of shares now held by the staff was 673. The tone and the feeling among the men were really splendid, and probably never were these attributes wanted more than at the present time. The proprietors would no doubt be interested to know the effect of the war upon their staff. Some 70 men had gone out under the colours—some of them the very best men the Company had got. Need he say the Board were busy seeing that their families were taken care of and looked after while they were away. The Board were not going to leave their co-partners to bear the burden alone. They had talked much about their staff being a family affair; and, if ever there was one, now was the time to show that their family was not going to be neglected. The Board had that morning passed several resolutions with regard to this matter; and he was instructed to let the proprietors know that the Board proposed that the cost of the additional charges should not be laid entirely upon them, but that a special fund should be raised to assist to meet the special charges, under which plan the Directors and the staff would pay a proper quota to support it. Everybody was anxious to do something. The Board proposed to start a fund of this kind, which would assist to help the necessary special charges. It had never been his practice to dip into the future or to prophesy with regard to coming events; and if ever there was a time when a man would hesitate to do so, and when it would indeed be foolish to take such a step, it was at the present moment. The Board, however, were taking all necessary precautions against any possibility of trouble in the present crisis. They were well found in stores of all kinds. They had coal for some months; and they believed their oil deliveries were secure. But, of course, there they must leave the matter. The Board had complete confidence in their General Manager (Mr. Harold W. Woodall) with regard to the management at Bournemouth, and in their Secretary with regard to the financial aspects in London, and likewise in all their colleagues. They reposed complete confidence in them, and were prepared to support them in every way they possibly could. The same confidence and the same support that the Directors gave to their staff, they asked that the proprietors should give to the Board. An experience of more than two decades in the administration of the affairs of the Company bid him to be sure that in making such an appeal to the proprietary, he was not likely to make the appeal in vain.

Sir CORBET WOODALL, D.Sc., said he seconded the motion with the greatest pleasure. They had all of them listened to the Chairman's address with peculiar interest, and, if he might venture to say so, with admiration. It had dealt with the situation very thoroughly and very feelingly. He agreed with the Chairman that it was a singularly unsuitable time to try to enter into the school of the prophets, and to talk about what was before them. One thing he (Sir Corbet) was delighted to know—that was, that, as in public affairs all the party differences and distinctions seemed to have vanished into thin air, so here the disposition on the part of workers of all grades to pull together and to increase so far as they possibly could the efficiency of the service was one of the marked and most helpful features of the time. What the future had in store no one could say; but at any rate what could be done to modify the painfulness of the situation, and to save from serious loss the interests of the proprietors, he was quite sure all connected with the concern would do to their utmost.

The motion was unanimously carried.

The CHAIRMAN moved the declaration of dividends, less income-tax, at the rates of 6 per cent. per annum on the preference shares, 7 per cent. per annum on the "B" ordinary shares, and 16 per cent. per annum on the original shares. In doing so, he said that he was glad to be able to say that, with some little difficulty, the Board had been able to arrange that these dividends should be paid. If it was not very difficult for gas companies to be able to earn dividends, it was still easier for proprietors to declare them; but there was the last step—namely, the payment, which was at the present time the difficult matter over which they had managed to get.

Sir CHARLES J. JESSEL, Bart., seconded the motion, which was unanimously agreed to.

Extraordinary General Meeting.

CAPITAL AUTHORIZATION.

An Extraordinary General Meeting was then held for the purpose of authorizing the Directors to raise (as required) additional capital, in accordance with the provisions of the Company's Act of 1903, by the creation and issue of 3000 preference shares of £10 each, limited as to dividend to 6 per cent. per annum, and £12,500 of debenture stock, carrying such fixed and perpetual preferential interest not exceeding the rate of 4 per cent. per annum as the Directors may attach thereto prior to the issue thereof.

Moved by the CHAIRMAN, and seconded by Mr. CHARLES L. MORGAN, a resolution was passed in relation to the preference stock; and then, proposed by the CHAIRMAN, and seconded by Mr. WILLIAM CASH, F.C.A., one was passed regarding the debenture stock.

The CHAIRMAN said he should like to emphasize the concluding remarks of his address, as to how heartily the proprietors did accord to their General Manager, the Secretary, the whole staff, and the workmen their thanks for the way in which the business had been transacted during the past half year. They had all risen to the occasion, and were determined to see the Company through these troublous times.

Mr. WILLIAM RICHARDS seconded the motion, which was cordially adopted.

Mr. WOODALL and Mr. PLUMB, in returning thanks, both assured

the proprietors that one and all were determined to do their best to see the Company through the troubles now overhanging the country.

Moved by Mr. J. C. BENWELL, F.C.A., and seconded by Mr. F. G. BARRETT, a hearty vote of thanks was passed to the Chairman and Directors.

The CHAIRMAN briefly acknowledged the compliment on behalf of his colleagues and himself.

NEWPORT (MON.) GAS COMPANY.

Steady Progress—Parliamentary Experiences.

Supplementing the brief notice last week of the proceedings at the recent meeting of the Newport (Mon.) Gas Company, it may be mentioned that Mr. T. G. CARTWRIGHT, who presided in the absence through indisposition of the Chairman of the Board (Mr. H. M. Brewer, J.P.), pointed out that in the first six months of this year there had been a capital expenditure of £2132, compared with £189 in 1913. This was due mostly to the laying of a new main at Maesglas. Although it meant an extra expense this year, they had every reason to hope that the expenditure would lead to a big return in the near future. With regard to the revenue account, coal cost them more by £1518 than in 1913. This they could not, of course, help; and as far as they could see there was no prospect of any immediate reduction. The sales of gas showed an increase of 6,475,600 cubic feet—a 3·7 per cent. increase, and in money £469. Residuals were practically the same, £7756, compared with £7851. This was better than expected, but he must warn them that probably this half year would not be so satisfactory. A large stock of coke was on hand, but trade all over the world was likely to be affected by recent events. Their parliamentary expenses amounted to £661. The balance to profit and loss was £8552, compared with £9187, and the balance carried forward to the next account was £11,569. When they considered how much extra they had had to pay for coal, and the extraordinary expenditure, it had been a satisfactory half year. The efficiency of the staff was all that could be desired. In respect to the gas-fitters considerable improvement had been made among some of the smarter men; and the examination lists of the City and Guilds of London Institute showed a remarkable return of successful men at Newport. Some explanation might be expected from him of their action in going to Parliament. The fact of the matter was that the Newport Corporation went to Parliament to secure power to supply electricity outside the borough. The Company, therefore, sought that the "Northumberland Clause" should be introduced, which meant that if, after a certain time, the electric service did not pay, the deficiency should be made up by an increase in the prices charged and not out of the rates. This, of course, was only fair. As they knew, the Newport Corporation's electric service had so far been a loss, but they had the rates to draw upon. It was not fair, however, that they should be allowed to draw upon the rates for supplying electricity outside the borough. As a matter of fact the House of Lords threw out the whole of the electric clauses in the Bill. This might be considered satisfactory from their point of view; but all they had asked for in their opposition were the safeguarding clauses he had referred to.

After the report had been adopted, the dividend of 5 per cent. declared, and the retiring Directors and Auditor re-elected, a vote of thanks was passed to the Chairman, Directors, and officials for the manner in which they had conducted the affairs of the Company,

Mr. CARTWRIGHT, in returning thanks, said that with the development of the town they could look forward to a great and profitable increase in business.

Mr. T. H. HAZELL (the Secretary), Alderman THOMAS CANNING, and Mr. J. H. CANNING also responded.

Alderman CANNING pointed out that the half-year's accounts showed an increase of 3½ per cent.; but it should be remembered that this was an increase on the 3½ per cent. increase twelve months ago. This showed that the Company were making steady and consistent progress. As the town developed, he had every confidence that their rate of increase would be even quickened.

PORTSEA ISLAND GASLIGHT COMPANY.

The Half-Yearly Meeting of this Company was held at Portsmouth on the 6th inst. Mr. R. EDGCOMBE HELLYER presided.

In proposing the adoption of the report and accounts, the CHAIRMAN said he had no doubt, as was natural, the one subject occupying the minds of all present was the grave position of international affairs. Consequently, he did not propose to review the half-year's working in detail, but would content himself with drawing attention to what he described as the two outstanding features—viz., the absence of permanent offices, owing to the erection of new premises, and the abnormal development of the demand for gas. He pointed out that the volume of business had not only increased, but had increased to a much greater extent than usual; and he thought that, having regard to the circumstances, the proprietors had every reason to be satisfied with the financial results obtained. Commenting on the position of the Company as affected by the European crisis, he assured the meeting that all measures possible had been taken to meet any emergency; and after expressing his opinion that no anxiety need be felt as to regular supplies of coal being obtainable at normal prices, as soon as the temporary disturbance of transport had been overcome, he took the opportunity of assuring the public that a supply of gas, without interruption, might be fully relied upon; and, although it was impossible for the Board to see to what extent the Company would be affected, they were unable to give any definite undertaking. He hoped, however, that no increase in the price of gas would be necessary.

The dividends [*ante*, p. 301] were declared, and the formal business concluded with the customary complimentary votes of thanks to the Directors, the chief officials, and the staff.

At a subsequent meeting of the Directors, it was reported that between sixty and seventy of the members of the staff and workmen had been called up for military service. It was decided to keep open the positions of all the employees so engaged, to pay reservists with dependants half their usual salary or wages, and to make up the difference between the Army pay and the regular salary or wages of all trained territorials, so that they should not be at any financial disadvantage through their loyalty.

TUNBRIDGE WELLS GAS COMPANY.

Presiding at the Half-Yearly Meeting of the Tunbridge Wells Gas Company last Wednesday,

Alderman W. H. DELVES began by referring to the national crisis. He said that Germany, who had been preparing for war for a long time, and had at last struck the blow, had counted upon the British nation being distracted and weakened by internal difficulties. He thought, however, that Germany had now found out her mistake. As regarded their Company, the broad result of the half year was that they had not earned their dividend; but this was a position shared by many other gas companies. They were drawing £840 from the reserve fund to pay the usual dividend; but this was the object in having a reserve fund, which (with them) now amounted to £15,000. While coal had cost considerably more, the sale of residuals was £760 less, and coke had gone down 1s. 6d. per ton. Carbonizing materials had cost 2d. per 1000 cubic feet of gas more than in the preceding half year; but 3½ per cent. more gas was sold—representing £700. The prospects for the next half year depended entirely upon the course the war took. They had had a very favourable contract for coal; but it was now in abeyance owing to the war risk clause. One of their contractors had had his ship commandeered by the Government. Still, it was hoped the Company would again be able to pay the usual dividend next half year. Twenty-five members of the Company's staff were Territorials; and the Directors were considering what they could do for the wives and families. It was very satisfactory that so large a proportion of their staff were ready to defend their country. He moved that the usual interim dividend be paid.

Mr. ARTHUR BRACKETT (one of the Directors) considered it was gratifying that the Company were paying the usual dividend directly it became due, seeing that so many companies were deferring the payment of dividends. When the Press was recording the postponement of so many dividends, he hoped it would be made known what the Tunbridge Wells Gas Company were doing. They could thus help to restore the feeling of healthy confidence which was what was needed at the present time.

ALDERSHOT GAS AND WATER COMPANY.

Moving the adoption of the report [*ante*, p. 290] at the half-yearly meeting of the Aldershot Gas, Water, and District Lighting Company, the Chairman (Mr. W. T. Robertson, J.P.) said that coal had remained dear, and poor prices had been realized for residuals. Compared with the corresponding half of 1912, the gross price of coal had increased 3s. 11·15d. per ton, and their returns from products had dropped a sum equivalent to 1s. 6·31d. per ton of coal carbonized, which, if taken together, was equivalent to paying 5s. 5·46d. more for the coal out of which they had to make gas. They were in a better position than a great many gas companies, because they had, at the beginning of this quarter, a little coal which they had had on previous contracts. Then in 1913 they reduced the price of gas 2d. per 1000 cubic feet over the whole area, which was equivalent to returning to the consumers a sum of £1700 per annum. This, of course, they had had to make good. When they came to study these various items, he thought they would realize that the balance-sheet the Directors had placed before them was an extremely satisfactory one. The net balance on the half-year's revenue account was lower than for the corresponding period of 1913 by £896. This concluded the dark side of the picture. The increase in the consumption of gas had been extraordinary. He believed, with the exception of special contracts which they always had, that the increase was somewhere about 11 per cent. This proved that gas as an illuminant and for all purposes was in the ascendancy, and that, given normal conditions, the Company would be more prosperous in the years to come than it had ever been before. They had had a most successful year as far as water was concerned. With regard to the electricity department, this had been established, the greater part of the machinery had been installed, and the mains were being laid; and they had hopes that during the autumn of this season they would be discharging their responsibilities to the respective districts by giving an adequate supply of current. All the works he referred to six months ago were proceeding; and he thought the results in time to come would prove that they were acting quite in the right way. There was a good deal to be done, with such enormous increases in their figures as he had indicated, to perfect the works, and bring them up to date. The General Manager (Mr. R. W. Edwards) was applying himself to every detail of that department; and ere long, he believed, they would be able to produce results equal to almost any company in the United Kingdom. Referring to the co-partnership scheme, which they were among the first of country companies to take up, he was happy to be able to say that the relationship between their workmen and all who were employed by the Company was of the very best. He felt sure the scheme would lead, by a settlement of the labour question, to that co-operation between the employer and the employed which would be to the advantage of the consumer, the stockholder, and the workmen.

Several shareholders expressed their satisfaction with the condition of affairs, and a cordial vote of thanks was passed to the Chairman, Directors, and staff. Mr. Edwards, replying on behalf of the staff, said they deserved every word that had been said in respect to their loyalty and efficiency. During the last year they had lost quite a number of their very best men, and though it was with the greatest regret, yet at the same time it was a pleasure to see men going from

Aldershot to higher positions in the gas profession. This had made a great difference in their organization during the past few months; but it was gratifying to know that those men who had succeeded to the vacancies had been able to take up their larger responsibilities with marked efficiency, and were giving the greatest satisfaction. Every man had striven his utmost to keep the Company in the position to which it had attained in recent years; and he felt sure the serious times which appeared to be looming on the horizon would be met with that devotion and loyalty which had characterized the staff and workmen in the past. As to the co-partnership meeting, it was gratifying to see men from the various districts and works meeting and taking the most sincere interest in the undertaking, each in his turn getting up and saying a few words, showing that they, at any rate, since the introduction of the scheme, had increased their interest in every way.

At a subsequent extraordinary meeting, the Directors were authorized to issue certain additional capital from time to time as required.

THE GAS INDUSTRY IN JAPAN.

Increase of Provincial Gas-Works—Competition of Gas and Electric Light.

The following remarks appear under the heading of "Current Topics" in the last number to hand of the "Journal of the Imperial Gas Association" of Japan.

Now that the gas industry is established in almost all the principal cities and towns throughout our empire, it is occupying the field, standing, as it does, face to face with the other method of lighting by electricity. The sudden development of the industry has, however, as we have repeatedly quoted, failed to bring the result of steady and sound progress; and therefore it has hardly escaped being influenced by the general depression in our economical and industrial circles. It is not to be wondered at that the management of a gas undertaking has become no easy matter during the last two or three years. Amalgamations of provincial gas-works that occurred last year so frequently, originated from nothing but such conditions, in the hope of making desirable alteration in management. By this amalgamation scheme, we, on our part, forecast at the time that the unfavourable condition in the industry would be improved during the current year, the indication of which has recently begun to be discerned, to our great satisfaction. This means a rise of small gas-works in the towns of minor importance in our local provinces, though not without an adverse occurrence of severe competition with electric lights in not a few cities and towns, reflecting naturally upon our gas industry in general. Instances of the establishment or promotion of small provincial gas undertakings of recent date we see in the towns of Shimabara, Kisarazu, Fukuno, Niitsu, Sano, and Hadano. The establishment of such small gas-works in our local provinces goes a long way to prove, with the gradual rise in the scale of the daily life of our nation, broader and better knowledge and understanding of gas on the one hand, while, on the other, there is a wider spread of gas undertakings in our empire. We heartily welcome this condition of affairs, on the ground that such a civilized means for the uses of daily life as gas or other undertakings in connection with the promotion of public utilities never fails to promote the existing status of any given locality to a still higher point of development—contributing thereby something towards national welfare.

Since last spring, no slight blows have been brought upon both gas and electric light companies in a few provincial cities, by severe competition between themselves. This severe competition in Nagasaki once threatened to have no end—rather being intensified with the advance of time. But happily it has since been pacified by the reconciliation of both parties. Furthermore, this has resulted quite recently in an amalgamation of the companies, after deliberate consideration, in order thereby to get rid of disadvantages accruing from the business management hitherto employed by them. Another case in Tokyo is still in continuance, to the regret of both parties, who recently tried timely measures in the hope of curtailing business expenses lest they should incur losses by this undesirable occurrence. An amalgamation scheme of gas and electric companies in Tokyo was talked of last year; but this is, so to speak, a castle in the air. Above all, what is specially noteworthy is a scheme for the establishment of gas companies at places where electric light companies are solely promoting their own interests, regardless of those of consumers. This means from the start competition with other lighting concerns; and a new lighting company may be regarded as established only to check the arbitrary influence of an old one. Such an enterprise is, indeed, not a thing to be hoped for; and this is not the way to lead both industries to success or to sound development. On the contrary, no ultimate benefit can be derived from such an arrangement. The only way to promote the interests of both industries is, we presume, to preserve the natural ground of each, displaying, of course, their peculiar phases to the fullest extent, enabling each to show to its proper advantage, thereby presenting the natural spheres of influence of the respective industries. In fact, varying attitudes toward other lighting industries or policy in opposition to them without conciliation are not for the good of either industry, but, on the contrary, are detrimental.

Bills Royal Assented.—In the House of Lords on Monday last week, the Kirkcaldy Corporation Order Confirmation Bill and the Sheffield Corporation Bill received the Royal Assent; and both Houses adjourned till the 25th inst.

Price of Gas at Milnrow.—At the monthly meeting of the Milnrow District Council on Thursday, the Chairman (Mr. J. T. Smith, J.P.) referred to the varying nature of the charges for gas in the Ogden district, and urged the Company's careful consideration of the Council's suggestion that they should make a uniform charge for gas for the whole of the Council's area. The district, he said, was a growing one, and, being near the centre of the Lancashire spinning area, was in a rapidly developing neighbourhood.

GLASGOW CORPORATION GAS SUPPLY.

The Accounts of the Department for the Year 1913-14.

We have received a copy of the forty-fifth report to the Corporation of Glasgow by the Committee on Gas Supply, with the accounts for the year from the 1st of June, 1913, to the 31st of May last; the former bearing the signature of the Convener (Mr. T. J. Irwin), and the latter that of the Treasurer (Mr. James Fleming). The following are the salient features of the report.

Finances.

Dealing first with finances, the Committee show the position by the following tabular statement:—

The gross revenue amounted to . . .		£1,051,970 9 2
The gross expenditure to	£890,428 6 1	
To which is added depreciation written off capital assets	78,155 1 3	
		968,583 7 4
The balance carried to profit and loss account being		£83,387 1 10
The Committee had to meet the following requirements during the year:—		
(1) Annuities on stocks	£21,136 17 8	
(2) Contribution to Glasgow Corporation loans fund, in respect of Glasgow Corporation 3 per cent. stock redeemable in 1921, issued in lieu of converted gas annuities	7,908 0 9	
(3) Interest on borrowed money, &c. . .	41,416 2 11	
(4) Sinking fund	58,597 18 1	
		129,058 19 5
Leaving a deficit on the year's operations of		£45,671 17 7
This has been met as follows:—		
The balance at the credit of the surplus revenue account at the close of the last financial year was		£53,402 12 4
Deducting the deficit above referred to .		45,671 17 7
Leaves to be carried forward		£7,730 14 9

The interest payable to the Corporation loans fund in respect of money borrowed was at the rate of £3 6s. per cent., compared with £3 5s. 9d. per cent. for the preceding year.

The Committee applied £4329 6s. 6d. of the amount at the credit of the sinking fund to the extinction of £1735 of £9 per cent. and £250 of £6 15s. per cent. gas annuity stocks; and the annuities formerly payable upon these stocks now cease to be a charge upon the revenue of the department. There was also redeemed during the year, by the application of moneys at the credit of the same fund, a further amount of £250,000 of loans raised under the Glasgow Corporation (Tramways and General) Order Confirmation Act, 1901. The amount added to the sinking fund for the redemption of annuities, loans, and £3 per cent. stock was £65,931 14s. The sinking fund, with its accumulations, now stands at £1,124,872, of which there has been applied in the redemption of borrowed money, £3 per cent. stock and annuities £1,086,742; leaving available for either of these purposes the sum of £38,130.

Working Statistics.

Turning to the working, the Committee express their regret that the market for residuals was unfavourable to the Corporation during the past year. Notwithstanding the greater quantity of coal carbonized, the diminution of income from this source amounted to £10,512. The average price received per ton of coal carbonized was 4s. 11·436d., compared with 5s. 5·878d. for the previous year—a decrease of 6·442d. per ton. The net sum realized from the sale of coke amounted to £145,493; being £827 less than that of the preceding year. The total quantity of coke sold was 307,984 tons, compared with 307,178 tons before—an increase of 806 tons. The average price received was 9s. 7·911d. per ton, compared with 10s. 0·837d. for the previous year—a decrease of 4·926d. per ton.

The quantity of coal carbonized in the year was 781,066 tons, compared with 741,838 tons in the year 1912-13—an increase of 39,227 tons. The average price paid for coals bought last year was 13s. 3d. per ton; being an increase of 1s. 7d. per ton compared with the preceding year. Contracts have been made for the supply of coals during the current year at an average price of 11s. 5¾d. per ton; being a reduction of 1s. 9¼d. on the previous prices.

The gas made per ton of coal carbonized was 10,386 cubic feet, compared with 10,424 cubic feet for the preceding year. The quantity of gas delivered and accounted for amounted to 7,469,436,602 cubic feet, compared with 7,070,833,972 cubic feet for the preceding year—an increase of 398,602,630 cubic feet, equal to 5 63 per cent. The greatest quantity sent out during the year in 24 hours was 38,243,000 cubic feet. The maximum daily make was 33,196,000 cubic feet. The unaccounted-for gas was 7·92 per cent., compared with 8·56 per cent. for the preceding year—a decrease of 0·64 per cent.

Distribution, Etc.

After giving a long tabular statement showing the sales of gas in the various districts of the city and suburbs in the past and the preceding year, the Committee turn to matters connected with distribution, and furnish the following particulars.

Gas-Meters.—The number of ordinary meters in use on the 31st of May last was 202,303, compared with 210,105 for the preceding year—a decrease of 7802. The number of prepayment meters in use on that day was 88,008, compared with 76,778—an increase of 11,230, and giving a net increase of 3428 meters. During the year, 32,768 meters were repaired, and 7551 ordinary ones were converted into prepayment meters.

Gas-Cooking Appliances.—There was a good demand for all kinds of domestic cooking appliances during the past year. On the 31st of May

last there were on loan 109,338 cookers and range fittings, 25,152 grills, and 37,662 boiling-burners—a total of 172,152, compared with a total of 145,142 for the preceding year.

Gas-Heating Appliances.—All kinds of these appliances are now meeting with favourable attention from the Committee's consumers; the demand on the Fitting Department being sometimes very heavy. The number of gas-fires on hire on May 31 last was 24,340—an increase of 11,751 over the preceding year; and the number on hire-purchase was 4038. The number of radiators on hire was 2447, and of gas water-heating appliances on hire-purchase 81.

Gas-Engines.—The number of gas-engines in use, and the total brake-horse-power, for the past and the preceding year were as follows:

	Number.		Brake-Horse-Power.
May 31, 1914	1372	..	19,804¾
May 31, 1913	1409	..	20,454¼
Decrease . .	37	Decrease . .	649½

Mains.—About 9¾ miles of new mains were laid during the year, which brought the total up to 1057 miles.

Works and Plant.

The Committee report that the first installation of vertical retorts at the Dalmarnock station is now practically finished; but the contractors have still a good deal of work to do to complete the contracts for the steel work, the telpher plant, and the ferro-concrete coke-hoppers. These various contracts are having every attention; and it is expected that the plant will be in full use during the winter season. Contracts have been made for the supply and erection at the chemical works of complete sections of the plants for dealing with the tar and ammoniacal liquor to be produced in the gas-works. At Milan Street, the workshops and stores are in full working order. The whole of the work of the Distribution Department on the south side of the river is dealt with at Milan Street. This extension has greatly relieved the congestion of work which took place at Walls Street, where only the work for the north side of the river is now undertaken.

Price of Gas.

Notwithstanding the unfavourable result of the year's operations, and the fact that the revenue derivable from the sale of coke, ammoniacal liquor, and tar is expected to be lower in the coming year, in consequence of an anticipated fall in prices for these products, the Committee recommend that, as the coal required for the current year has been contracted for at prices under those of last year, the scale of charges for gas should remain the same, with the exception that the rate for prepayment supply should be reduced from 2s. 5d. to 2s. 4d. per 1000 cubic feet.

Work of the Staff.

The Committee conclude by expressing their pleasure in recording their appreciation of the efficient manner in which the work of the department was carried out by the entire staff (Mr. Alexander Wilson, M.Inst.C.E., being Engineer and General Manager) during the year.

Statistical Statements.

The report of the Committee is followed by the accounts of the Gas Department set out in the usual form; and an appendix contains (*inter alia*) memoranda of gas made, sold, &c., for each year from that ending May 31, 1901, down to the last. We give below the particulars for the past two years.

Memoranda of Gas Made, Sold, &c.

—	Year Ending May 31, 1913.	Year Ending May 31, 1914.
Quantity of gas made . . . cubic feet	7,732,914,000	8,112,616,000
Do. sold or accounted for . ,,	7,070,833,972	7,469,436,602
Do. unaccounted for . . . ,,	662,080,028	643,179,398
Do. do. . . . . per cent.	8·561	7·928
Average price received per 1000 feet sold .	1/10·888	1/10·983
Average price per ton of coal carbonized .	11/4·226	13/1·085
Cost of coal per 1000 cubic feet of gas made	1/1·07	1/3·18
Capital employed per 1000 cubic feet of gas sold	6/5	6/3
Coal in stock at beginning of year . tons	61,972	84,511
Coal received during year . . . . ,,	764,377	796,785
Coal carbonized during year . . . ,,	741,838	781,066
Coal in stock at close of year . . . ,,	84,511	100,230
Quantity of coke sold . . . . . ,,	307,178	307,984
Average price received per ton of coke .	10/0·837	9/7·911
Quantity of coke sold, per ton of coal carbonized	8·281 cwt.	7·886 cwt.
Average price received for ammoniacal liquor and tar per ton of coal . . .	5/5·878	4/11·436
Quantity of gas made per ton of coal . .	10,424 c. ft.	10,386 c. ft.
Quantity of gas sold or accounted for, do. .	9,531 ,,	9,563 ,,
Quantity of gas unaccounted for, do. . .	893 ,,	823 ,,
Illuminating power of gas prescribed . .	14 cand.	14 cand.
,, ,, ,, supplied . . .	18·05 ,,	17·48 ,,
Number of public lamps—flat-flame . .	881	554
,, ,, ,, incandescent .	28,974	29,522
High-pressure lamps	50	67
Cookers and range fittings on hire and on loan	90,521	109,338
Grills on loan	24,682	25,152
Gas-rings on loan	29,939	37,662
Gas-heating appliances sold—hire-purchase system	6,391	4,119
Gas-heating appliances on hire	12,589	26,787
Gas heating and cooking appliances sold .	657	4,183
Number of meters in use—ordinary. . .	210,105	202,303
,, ,, ,, —prepayment .	76,778	88,008
Capacity of holders—cubic feet	44,376,000	44,376,000
Greatest quantity of gas delivered in one day, cubic feet	34,829,000	38,243,000

WORK FOR OLDHAM UNEMPLOYED.

At the last meeting of the Oldham Gas Committee, Mr. T. Duxbury (the Engineer) reported that the coke storage area at the Higginshaw works was too small for present requirements. The time, he suggested, might be thought opportune for considering the construction of a new coke-yard, and for extending the existing overhead gantry. This would provide work for two or three months for about 50 men outside the present staff. The estimated cost of the excavation would be £1500, and the total cost about £2000. Alderman H. Wilde, J.P. (Mayor of the Borough, and Chairman of the Gas Committee), agreed that the Council ought in the special circumstances to do all they could in every department to provide work. Mr. A. Andrew (the General Manager) expressed similar sentiments.

The motion that the work be put in hand immediately was carried unanimously.

Writing later, our Manchester correspondent says he is officially informed that the foregoing paragraph referring to the provision of work for persons thrown out of employment through the war refers to excavating work at the Higginshaw station which is required to level a portion of the land prior to paving it for coke-storage purposes. "Our present area for the storage of coke," says Mr. Andrew, "is almost fully occupied with stocks at the present moment; and during the ensuing winter we anticipate having to make provision for the storage of a further large quantity of coke, owing to the difficulty there is in disposing of it. This work would have been carried out sooner or later, and has been under consideration for some time; but we are hurrying it forward just now in order to relieve distress. The men we shall use for the present will be those who are recommended to us by the Relief Committee which is being formed in the town; and each man will be found half-a-week's work, so as to find employment for as large a number as possible." He adds that this principle might be extended to the permanent workers. "Retort men, for instance, who are in receipt of good wages, would draw, by working half-a-week, 20s. or over each week, and therefore would not feel the pinch as much as a labourer whose half wages would only be 13s. or 14s. per week."

Regarding the Water Department, Mr. Andrew states that "arrangements have been made with the West Riding Constabulary to provide armed men at each reservoir belonging to the Corporation situate within their area. These will also be supplemented by boy scouts, who will form encampments in the neighbourhood of the reservoirs, and will act as messengers and inform the policemen on duty of any suspicious character who may be observed on the moors among which the reservoirs are situated." Similar precautions are being taken on the Lancashire side, with the exception that at present the men on duty will not be provided with firearms.

CROYDON CORPORATION WATER SUPPLY.

Adoption of the Chlorine Process of Sterilization.

Early last year, the Water Committee of the Croydon Corporation presented a report on the subject of the water supply of the borough. They had considered one submitted by Mr. W. Vaux Graham, M.Inst.C.E., and the Borough Engineer in regard to safeguarding the supply. After making inquiries, and inspecting the chlorine process which is in operation at the Reading Water-Works, the Committee instituted experiments to test its suitability for treating Croydon water. The experiments were duly carried out, with the result that the Medical Officer of Health reported that the process was a thoroughly efficient one, and might be safely used. The Borough Engineer reported on the cost of constructing works and providing the necessary plant; and he put it at £14,000, *plus* £1000 for extra lengths of pumping mains and contingencies. Allowing an average period of twenty years for repayment, he estimated the annual cost during this time, including working expenses, at £1300 per annum, equal on a quantity of 3,100,000 gallons daily to ¼d. per 1000 gallons. He said the plant would be able to deal with 4,000,000 gallons a day; and he estimated that on this quantity the cost would be 0·2d. per 1000 gallons.

At a recent meeting of the Town Council, the Committee reported that they had adopted the reports above referred to, and recommended that the water obtained from Russell Hill should be treated by the chlorine process, and that they should be authorized to have plans, specifications, and estimates prepared for the construction of the necessary works. In moving the adoption of the report, Alderman Sir F. T. Edridge said the question put to the Committee was as to the necessity of safeguarding the water supply of the borough. They had considered several methods, including the ozone process and violet rays, but he believed in neither case had it been shown that these processes made the water absolutely pure, and the cost was considerable—something like 1½d. per 1000 gallons, in place of the sum put down in the report. They had also considered the safeguard that might be given by the addition of chlorine, which process the Committee considered the cheapest and most effective. The colour, taste, or smell of the water would not be affected by the process, and the Medical Officer of Health stated that the percentage of chlorine used could hurt no one. The new reservoir would be equal to dealing with about 4 million gallons a day, and the cost of the work was estimated at from £15,000 to £16,000 at the outset. Including the sinking fund and interest, the ordinary working charges would not exceed about £1300 a year, which would be considerably less than ¼d. per 1000 gallons. The report was adopted.

South Hants Water Company.—At the half-yearly general meeting of shareholders, held at Southampton last Friday week, the Directors reported that the rent-roll during the year had been increased by the addition of 774 houses, representing a rental of £1217. The profit and loss account at June 30 last showed a credit balance of £11,919; and it was proposed to pay a dividend at the maximum rate on each class of ordinary shares for the six months. The report was adopted.

PROTECTION OF GAS AND WATER WORKS.

Volunteer Civil Force.

In the column of "War Notes," on p. 380 of this week's issue of the "JOURNAL" is given the substance of a letter received from the Secretary of the "Volunteer Civil Force," offering the services of its men for the guarding and protection of gas and water works throughout the country. As readers may not be acquainted with this organization, a list of its aims and objects may be reproduced.

1. To assist as a civil force in the maintenance of law and order, and the preservation of the peace.
2. To provide a reserve force available for the maintenance of internal order.
3. To oppose all those who advocate the use of force or violence in attacks upon the British Constitution, the destruction of national institutions, the confiscation of property, the coercion of free labour, interference with personal liberty, or revolutionary objects of any kind.
4. To render help to railways, ships, docks, tramways, electric power, light, sanitary, or other public services in time of emergency.
5. To insure the public against starvation, famine, or deprivation of food, milk, coal, or other necessities of life when a paralysis of the existing sources of supply is threatened.
6. To recruit and supplement the various corps available for special constables, life-boat, fire brigade, salvage, ambulance, and all kinds of life-saving.
7. To provide a system of physical and moral training for young men, to render them proficient in some branch of public service, to educate their sense of public spirit and patriotism, and equip them for the full discharge of the responsibilities of citizenship.

The force was founded on Trafalgar Day, 1911, by Mr. W. M. Power, the officer commanding at the present time; and after the Dock Strike the following year, among the services that the organization was prepared to render were given the following:—

1. The protection from molestation of free labourers, and the escorting of them to and from their work at the docks.
2. The watching over and guarding, night and day, of vessels lying in various docks, bringing articles of food, and other necessities for existence, from various parts of the world.
3. The assisting in discharging the cargoes from these ships, thus assuring the distribution of them to the public, and saving valuable foodstuffs which, otherwise, would undoubtedly have been allowed to perish.
4. The furnishing of unmistakable evidence to the strikers that they will not be permitted, without let or hindrance, to coerce and intimidate men who are willing and anxious to work for the support of their wives and families; and to those free labourers the assurance that they should receive every protection against molestation and injury while engaged in their praiseworthy work.
5. The proof afforded to the public at large that, in the existence of such an organized force, could be found a safeguard of their best interests, and to the Government authorities, that the recognition and support of such a force would, in the future, render recourse to armed military intervention a very remote contingency or necessity.

Further particulars of the assistance offered can be obtained direct from the Secretary, at Ruskin House, Rochester Row, Westminster.

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

The Gas Committee of the Glasgow Corporation have issued their forty-fifth annual report and balance-sheet, embracing the year ended the 31st of May last. The amount carried to the profit and loss account was £83,387; but out of it the Committee had to meet annuities, interest, sinking fund, &c., which required £129,059. There was consequently a deficit of £45,672. This was met by drawing the amount from the balance of £53,402 at the credit of the surplus revenue account at the close of the previous financial year; leaving £7730 to be carried forward. The Committee express regret that the market for residuals was unfavourable during the year. There was a good demand for all kinds of domestic cooking appliances during the year; while gas-heating appliances are meeting with favourable attention from the consumers, the demand in the Fitting Department being sometimes very heavy. Notwithstanding the unfavourable result of the year's operations, and the fact that the revenue derivable from the sale of coke, ammoniacal liquor, and tar is expected to be lower in the current year, the Committee recommended that the charge for gas to prepayment consumers should be reduced by 1d. per 1000 cubic feet, from 2s. 5d. to 2s. 4d. Favourable coal contracts permitted of this. [Extracts from the report and accounts will be found elsewhere.]

On the joint recommendation of the Finance Committees of the General Department and the Gas Department, the Glasgow Corporation as at the 15th of May last applied £250,000 of the gas sinking fund in redemption and extinction of debt, which will result in an annual reduction in expenditure, though the sinking fund charge will not be affected.

The Gas Committee of the Dumfries Town Council have lately had under consideration the annual report of the Gas Manager (Mr. S. Dickie), and the estimates for the current year; and they recommend that £1000, instead of £2000, should be carried to the reserve fund, and that the following should be the charges per 1000 cubic feet for gas: Ordinary consumers, 2s. 6d.; prepayment meter consumers, 2s. 11d.; public lighting, 2s. 6d.; gas-engines, 2s. 3d.—the same discounts to be allowed as last year. The Provost, in moving the adoption of the report, said the price of gas was now lower than it had ever been; and he thought it said a good deal for the Manager that the price had been reduced by 2d. per 1000 cubic feet, looking to the way in which coals and wages had gone up. The Manager submitted a report on the salaries of the staff; but, as the foreman at the gas-works had been called away as a navy reservist, the subject was left in abeyance.

At the last monthly meeting of the Helensburgh Town Council, the Hon. Treasurer (Mr. Penn) submitted the annual statement in regard to the finances of the burgh. There was a loss of £885 on the year's working of the gas undertaking. Out of the £2000 transferred to depreciation and the renewal fund, £809 had been spent in the reconstruction and renewal of offices at the works; leaving £1191 to the credit of the fund. The total liabilities of the Gas Department at the end of the year amounted to £39,850, and the assets to £55,013; leaving a surplus of £15,163.

It is recommended that the wages of lamplighters in the employ of the Glasgow Corporation Lighting Department shall be increased—those of stair men to range from 17s. to 22s. per week, and those of street men from 27s. to 30s. The increased cost to the department will be £5172.

At the monthly meeting of the Denny Town Council last Tuesday, the accounts of the gas undertaking for the past financial year were presented. They showed that, after meeting all charges, including the interest and sinking fund, there was a surplus of £390. Bailie Lochhead, the Convener of the Gas Committee, said that after taking into account the additional charges to be made during the current year, it would be possible to reduce the price of gas to the extent of 2½d. per 1000 cubic feet, and still leave a small estimated surplus at the close of the year ending May, 1915. He also mentioned that the electric light undertaking showed a surplus of £40, which would permit, if the Council so desired, of a reduction of ½d. per unit. Bailie Sawers moved that the prices of gas and electricity be reduced as mentioned; and this was unanimously agreed to. The Gas Manager (Mr. John M'Donald) reported that there are only 27 houses in the burgh in which gas is not used.

The annual meeting of the Macduff Gas Company was held last Wednesday—Bailie Sim presiding. The report and accounts for the past financial year were submitted, and considered highly satisfactory; and the usual dividend of 5 per cent. was declared. Bailie Sim was appointed Chairman of the Company for the ensuing year.

The Brechin Town Council have unanimously agreed to ask Mr. George Baxter, the Water Engineer of the Burgh of Dundee, to report on the works that are necessary to secure to Brechin an adequate supply of water throughout the year; and the Dundee Town Council are to be requested to give him permission to undertake the work.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Aug.* 17.

In the absence of business, the values of tar and ammonia products remain nominal at about the prices last quoted. For 60's crude carbolic acid, 2s. 6d. per gallon net, casks free, is quoted.

Tar and Tar Products in the Provinces.

Aug. 17.

With regard to tar products, in the present state of affairs it is very difficult to quote prices for the different products. From all quarters one hears of such extraordinary prices being paid that it is difficult to mention them, as special conditions surround them in almost every instance; and, furthermore, the majority of manufacturers are at the moment very unwilling to do business. Finance is, of course, playing a prominent part in transactions, which naturally makes the settling of contracts very difficult.

Sulphate of Ammonia Prices in the Provinces.

LIVERPOOL, *Aug.* 15.

During the past week there has been no improvement in the situation of this article. Nearly all shipping facilities have remained closed; while in the few cases where they have been open the advanced rates of freight and the heavy premium required for war risk have prevented merchants from availing themselves of the opportunities. The nearest value to-day is probably £10 15s. to £10 17s. 6d. per ton f.o.b. at the ports for early delivery. In the forward position, there is absolutely nothing to comment upon; neither buyers nor sellers having shown any disposition to trade at present.

Nitrate of Soda.

No further advance has taken place in the values of this material, which remain 11s. 3d. and 11s. 6d. per cwt. on spot for ordinary and refined quality respectively.

Rossendale Gas Company.—The report of the Directors for the half year ended June 30 last states that the sales of gas show a decrease of 3·75 per cent. compared with the quantity sold during the corresponding period of 1913. Statutory dividends, ranging from 10 per cent. on the original shares to 5 per cent. on the new preference shares have been declared. The total share capital paid up is £136,079. The sales of gas realized £16,598, and residual products £5265. There was a profit for the half year of £5681. The manufacture of gas cost £11,505, distribution £2025, and rents, rates, and taxes, £2171. There had been sold 90 million cubic feet of gas at 2s. 9d. per 1000 cubic feet, and 19 millions at 2s. 6d. A sum of £37 had been expended on new mains and services; the total capital expenditure to date being £181,981. The reserve fund now stands at £11,759. The profit for the half year ended Dec. 31 last was £6028.

COAL TRADE REPORT.

Northern Coal Trade.

The coal trade of the North is beginning to show some slight recovery, though the questions of payment for cargoes still involve difficulties, as sellers have heavy bonds to enter into, given to secure delivery of coals to neutral ports. In the steam coal trade, these difficulties are most apparent; and the effect of the limited shipments on the export coal trade is seen in the fact that at one of our north-eastern ports the total shipments are just about one-fifth of what they were a year ago. There is now, however, some expectation of larger trade. Steam coals are based on about 15s. 3d. per ton f.o.b. for best Northumbrians, and probably exports to France, on the one hand, and to Norway, on the other, will be heavier. Steam smalls are in fair supply at perhaps 8s. per ton f.o.b. The gas coal trade is a little more active, though many of the collieries are working short time. Best Durham gas coals are somewhere near 13s. 3d. per ton f.o.b., with second-class kinds about 12s. There appears to be an export demand for gas coal showing itself for French southern ports; but the rates of freight are relatively high, and this limits business. No new contracts of moment are reported. Coke is steady. Little seems to be doing in gas coke, for the export demand has been much reduced of late. Gas coke prices are irregular, especially for large cargoes.

Gas-Meter Testing in Middlesex.—In a report recently presented to the London County Council by the Public Health Committee, it was stated that since the meter-testing station was opened at Edmonton no fewer than 1,113,967 meters had been tested there; the fees earned amounting to £33,841. The staff consists of an inspector, nine assistants, a clerk, and a porter. After meeting all expenses, there was a clear profit last year of £1063; and since the station was first opened £13,128 has been earned in aid of the county rate. Last year 83,877 meters were received from makers, and 2771 of them rejected; and out of 6956 received from gas companies and consumers, no fewer than 4638 were rejected.

Romford Gas Company.—The report of the Directors to be submitted at the half-yearly ordinary general meeting next Saturday states that the revenue profit for the past six months carried to profit and loss account was £3410. This amount added to the balance brought forward from the previous half year makes an available total of £7944. After providing for interest on the debenture bonds, consumers' deposits, reserve fund, and insurance fund, there remains a net balance of £7335; and out of this sum the Directors recommend dividends at the rate of 13½ per cent. per annum on the original shares, and 10½ per cent. per annum on the "B" shares (both less income-tax). These will amount to £3093, leaving £4241 to be carried forward. The sale of gas showed an increase of 10·95 per cent. over the corresponding half year of 1913.

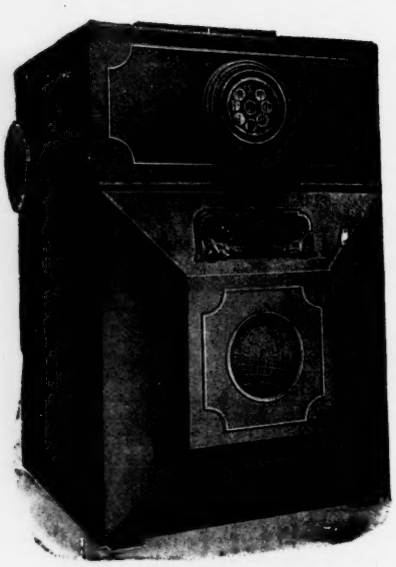
Lancashire District Report of the Gas-Workers' Union.

Mr. J. R. Clynes, M.P., the General Secretary of the Lancashire District of the National Union of Gas-Workers and General Labourers, in his report for the quarter ended June 27, states that expenditure in connection with strikes and lock-outs is still very heavy; but despite recurring stoppages which directly or indirectly entitle the members to some form of dispute pay, the Union have met all claims which come within the rules. After pointing out that the officers of the district have been extremely busy in the branch of work which secures the greatest advantages for members, but which is least known to the general public—the unobtrusive, but valuable, work of negotiation and peaceful settlement of men's claims—Mr. Clynes goes on to say that there have again been instances where members desired the Union to insist on "recognition." He, therefore, warns members themselves against the doctrine which they would impose on employers. "Recognition of obligations to a union and of the duties of membership are," he concludes, "sometimes overlooked, especially by new members, who, although the latest comers to the Union, are often the first to insist on other persons fully recognizing the duty which they themselves delayed so long."

Eastbourne Gas Company.—The report of the Directors, to be submitted at the ordinary general meeting next Monday, points out that, in common with other gas undertakings, the Company have suffered considerably from the increased cost of coal and the decreased income from residuals. The revenue account shows a profit for the half year of £6085. There was a balance of £16,388 at the credit of the profit and loss account, after payment of the dividend in February and other charges. The Directors therefore recommend that a dividend for the last half year be declared at the rate of 7¾ per cent. per annum upon the £65,000 of "A" stock, of 6¼ per cent. on the £198,000 "B" stock, and of 5 per cent. upon the £3150 preference stock. This will absorb £8785, and leave a balance of £7603 to be carried forward.

Shrewsbury Gas Company.—The 94th annual meeting of this Company will be held on the 1st prox. The statement of accounts for the year ended June 30 shows that the profit amounted to £7394. An interim dividend of 2½ per cent. was paid in March; and the Directors now recommend that a final dividend of 3¼ per cent. (making 5¾ per cent. for the year) be declared, leaving a balance of £1044 in the profit and loss account. The reserved fund amounts to £12,639, and is fully invested. There was an increase of 3 million cubic feet in the consumption of gas during the year; but the Company has suffered from the abnormally high price of coal and the slump in the value of residuals. The Directors have obtained a small concession in the price of coal for the current year; but the residuals market, they say, "remains in a very poor condition." The number of stoves on hire at June 30 was 4365 (an increase of 462); and there were 4296 slot-meters in use—an increase of 146.

BRADDOCK'S IMPROVED GAS METERS



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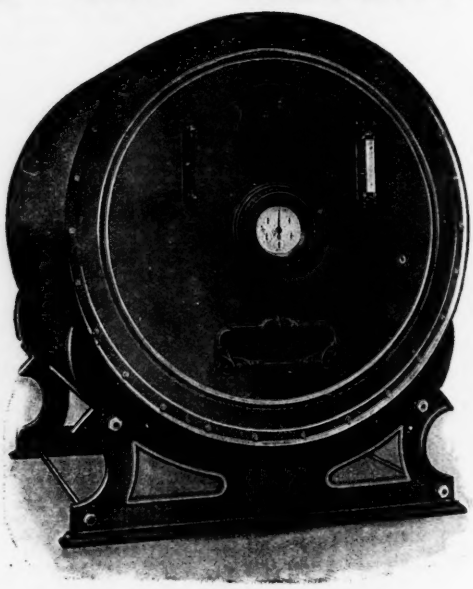

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Truro City Water Supply.

We learn that, with a view to improving the filtration of the water supply of the City of Truro, and of bringing the works into line with the most modern system of supply, it has been decided to substitute Candy mechanical filters for the present open sand filters. At the half-yearly meeting of the Truro Water Company, held on the 1st inst., the Directors reported that the further installation of Candy filters would soon be in operation, and that the cost of working the new filters would be considerably less than the expenses attendant on the sand beds; while the capital cost of the Candy filters is much below the heavy expenditure that would have been incurred by the construction of the area of additional sand beds necessary for giving an adequate supply of properly filtered water. The cost of the new Candy mechanical pressure filters (about £1400) will be paid out of the balance of profit after the 6 per cent. dividend is paid; and there will then be a sum of £2049 carried forward.

Fire at a Tar-Works.—Last Tuesday night an alarming outbreak of fire occurred at Messrs. Major and Co.'s tar distillery in Hull. The works are in close proximity to the Hull municipal almshouses, and the inmates were greatly scared—many of them having to be removed from their rooms. The fire brigade prevented the spread of the flames and eventually extinguished the outbreak.

Croydon Gas Company.—The 135th half-yearly meeting of this Company will be held next Friday. From the report that will be submitted by the Directors it appears that the sales of gas last half year exceeded those of the corresponding period of 1913 by 7·56 per cent.; the number of consumers increased by 931; that of stoves on hire was greater by 1430 cookers and 879 fires; while 74 and 207 respectively were sold to consumers—representing a total increase in gas-stoves for the half year of 2091. The profits were adversely affected by the increased price of coal and the reduced market values of residuals. During the half year £3155 of "D" stock, £4540 of 5 per cent. stock, and £20,000 of 4 per cent. debenture stock were issued. A resolution is to be submitted to the proprietors authorizing the Directors to raise further capital (under the powers of the Company's Act of 1904) as may be required for the purposes of the Company. The reconstructed condensing and washing plant of No. 1 section has been brought into operation, and a contract entered into for the erection of the additional gasholder, the tank for which is now under construction. The enlargement and alteration of the Company's chief offices at Katharine Street is nearing completion, and the new building is already occupied. After providing for all fixed charges there remains available for division a balance of £42,570; and the Directors recommend that dividends be declared at the following rates per cent. per annum: "A" stock, 15; "B" and "C" stocks, 12; "D" stock, 5; "E" stock, 10—all less income-tax. These dividends will absorb £23,638, leaving a balance of £18,932 to be carried forward.

Chichester Gas Company.—The half-yearly meeting of the City of Chichester Gas Company will be held next Tuesday, when the Directors will report that the balance standing to the credit of the profit and loss account, net revenue (after providing for interest on the debenture stock, temporary loans, &c.), amounts to £2208, out of which they recommend a dividend at the rate of 7 per cent. per annum upon the "A" capital stock, and £4 18s. per cent. upon the "B" and "C" capital, less income-tax. The accounts disclose a small increase in the gas rentals; but the increased price of coal has again adversely affected the accounts for the half year, and the residual products "have unfortunately fallen in value." The Engineer (Mr. T. N. Ritson, Assoc.M.Inst.C.E.) reports that the works and mains are in a "thoroughly efficient condition."

Winchester Water and Gas Company.—In the report of the Directors for the half year ended June 30 it is stated that the receipts from the sale of water and gas continue to show a satisfactory increase. The balance of the net revenue account available for dividend is £9546; and the Directors recommend the payment of a dividend on the preference stock at the rate of 4 per cent. per annum, and on the consolidated ordinary stock at the rate of 4¼ per cent. per annum—less income-tax. The Engineer (Mr. H. C. Head, Assoc.M.Inst.C.E.) certifies that the whole of the Company's plant has been maintained in a thorough and efficient condition. It is added that, on the declaration of war, ten of the Company's employees were called up for active service—in most cases leaving wives and children at home. The men's places are being kept open for them, and allowances are being made to their dependants. Difficulties are already being experienced in obtaining deliveries of goods under contract; but the Company "holds good stocks which it is hoped will be sufficient."

Weymouth Consumers' Gas Company.—At the half-yearly meeting of shareholders next Thursday, the Directors will report that the business done in the half year ended June 30 again showed an advance. The quantity of gas sold exceeded the sale in the corresponding half of 1913 by 4,890,900 cubic feet—the increase being equal to 7·59 per cent. The gas-rental consequently showed a substantial increase, as did the meter and stove rental. Residuals in the aggregate produced practically the same amount as a year ago; the loss on coke and ammonia, owing to lower prices, being nearly balanced by the improved yield from tar. The profit made was £2686; and out of this the interest on the debenture stock has been met. The Directors will recommend that a dividend on the ordinary stock be declared at the maximum rate of 5 per cent. per annum (less income-tax), and that the balance be carried forward. The report concludes: "Recently the Directors purchased a year's supply of coal at more advantageous prices than have been ruling for some time. Reference was made in the last report of the Directors to the Weymouth and Melcombe Regis Corporation Bill, which was being promoted in Parliament. In this Bill the Directors succeeded in obtaining the insertion of a clause for the protection of the Company's interests so far as they may be interfered with by the works the Corporation contemplate carrying out."

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East Worcestershire Water Company.—The report of the Directors of this Company states that during the half year ended June 30 there were 143 additional services laid on, making the total 8490, exclusive of Droitwich, Studley, and Astwood Bank, which are supplied in bulk. The net profit was £2608, which, added to £2076 brought forward, makes a disposable balance of £4684, which it is proposed to appropriate as follows: To pay a dividend at the rate of 5 per cent. per annum, free of income-tax, £1831; to provide depreciation on mains and machinery, £400; to carry forward the balance, £2453. The house-to-house inspection of water supplies in the Company's district (referred to in the last report) has now been completed; and the question of the adjustment of the charges for house services, so as to bring them more into conformity with the terms authorized by the Company's Acts of Parliament, is receiving the careful consideration of the Directors.

Peterborough Gas Company.—At last Tuesday's half-yearly meeting of this Company, under the chairmanship of Alderman D. H. Redhead, the Directors reported a net balance to the credit of the profit and loss account of £10,719; and they recommended the payment of 5 per cent. on the new preference shares and 7½ per cent. on the consolidated ordinary stock, which would absorb £3513 and leave a balance of £7206. The Directors have decided to reduce the price of gas for lighting and heating by 1d. per 1000 cubic feet; and this will allow the holders of the ordinary stock to receive their dividends in future free of income-tax—equal to ½ per cent. per annum. The Chairman said the gas sold during the last half year amounted to 98 millions—an increase of 3 millions over the corresponding period a year ago; the total number of meters was 6665, an increase of 199; and cookers were up by 247, to a total of 4952. The fees of the Directors were unanimously increased by 300 guineas per annum, making a total amount of £945.

Brighton and Hove General Gas Company.—This Company's half-yearly meeting will be held at the London Offices, next Friday, when the Directors will report that, compared with the first half of the year 1913, the sale of gas increased by 26,519,700 cubic feet, or 3·7 per cent.; but the revenue from residuals was £3730 less—mainly owing to the general fall in the value of coke, tar, and ammonia products. The profits for the last half year, including a small sum received for interest, amounted to £23,597, to which was added £43,056 brought forward from the previous half year, giving a total of £66,653. After charging income-tax and interest on the debenture stock, and appropriating £1800 to the capital redemption fund, a sum of £61,422 is available for the payment of dividends, which the Directors recommend at the statutory rates, varying from 4 to 11½ per cent. per annum. This appropriation will require the sum of £23,853, and leave a balance of £37,569 to be carried to the credit of the profit and loss account for the current half year. Following the reduction made in the price of gas of 1d. per 1000 cubic feet as from Jan. 1, the Directors have decided upon a further reduction of 1d. as from July 1. The price in Brighton and Hove is therefore now 2s. 8d. per 1000 cubic feet.

A Gas Manager's Gallantry.—Mr. J. A. Gray, the Manager of the Teignmouth Gas-Works, played a gallant part in a tragic occurrence last Thursday, while bathing from the beach. There was a rough sea, and a strong undercurrent, and Mr. Gray warned some other people not to venture into deep water. Immediately afterwards he was called upon to assist a lady, Miss Burgoyne, who was unable to make headway against the current. He got her into shallow water, where she could stand, but she and half-a-dozen others were carried off their feet again. Mr. Gray again assisted Miss Burgoyne and another lady, Mrs. Badcock, ashore. Another gentleman assisted a third lady; but two ladies could not be reached in time, and unfortunately lost their lives.

West Surrey Water Company.—At a meeting of the shareholders of this Company, held last Tuesday at 38, Parliament Street, Westminster, maximum dividends of 7 per cent. per annum were declared upon the ordinary £10 shares issued under the Acts of 1877, 1888, and 1901; and a maximum dividend of 10 per cent. per annum was declared upon the ordinary £10 shares of the Company issued under the Act of 1869. These payments would absorb £4493, and leave a sum of £2775 to be carried forward. The income for the past half year, after making provision for empty houses, irrecoverable rates, &c., amounted to £9040, and the expenditure to £3588. There were laid 1536 yards of 3, 4, and 6 inch cast-iron pipes for the extension of service mains, &c.; and 58 additional supplies were connected—representing an increased rental of £282 per annum. The Engineer and Manager (Mr. John K. Hill (reported that the whole of the Company's engines, boilers, buildings, filter-bed, high service and storage reservoirs, mains, and works are in good working condition. The erection of the water-tower on St. George's Hills, Weybridge (as mentioned in last report) has been completed and taken into use, and has proved very satisfactory.

Wrexham Water Company.—The annual meeting of the Wrexham and East Denbighshire Water-Works Company was held last Tuesday. The Directors reported that the expenditure on capital account, amounting to £1578, had been chiefly incurred in extending the mains in various parts of the district; and in consequence of the various projects for the developments of certain areas within the Company's districts it had become necessary to make considerable extensions of mains and also to lay an additional trunk main from the high-level works to meet the increased demand for water. The debit balance on capital account now stood at £10,129 13s. 4d.; and as further expenditure on this account was contemplated, owing to the extensions of mains referred to, it would be necessary to raise additional capital in order that the account might be properly adjusted. After payment of the usual charges, the dividend upon the preference stock, the interim dividends of 7 per cent. per annum upon the consolidated stock, and £4 18s. per cent. per annum upon the ordinary stock for the half year ended Dec. 31, 1913, and interest upon mortgages and debenture stock for the year, a balance remained on the net revenue account of £7998. The Directors therefore recommended similar dividends for the last half year. The report was adopted; and £200 was voted to the Directors for their services.

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